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Army Sets 15th Conference On Design of Experiments

Participants in the 15th conference on the Design of Experiments in Army Research, Development and Testing, Oct. 22–24 at Redstone (Ala.) Arsenal, will focus on the theme of "Techniques for Evaluating Performance of Complex Systems."

Scheduled for the keynote address is Dr. John E. Condon, director, Reliability and Quality Assurance, National Aeronautics and Space Administration, whose topic is "Reliability Applied to Space Flight."

Dr. Nancy R. Mann of Rocketdyne Corp. is programed for the second invited address on "Systems Reliabil-

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Dr. Tucker Takes Over As Principal Deputy DDRE

Principal Deputy Director of Defense Research and Engineering, a position vacated by the resignation of Dr. Finn J. Larsen in January, recently became the title of Dr. Gardiner L. Tucker, a well-known industrial scientist and executive.

Dr. Tucker accepted an appointment as Deputy Director of Defense Research and Engineering (Electronics and Information Systems) in July 1967, and doubled as acting successor to Dr. Larsen following his de-

(Continued on page 5)

Engineers Dedicate Construction ER Lab

CERL (denoting Construction Engineering Research Laboratory), the only institution of its kind in the U.S. and believed unique in the world, was dedicated July 25 as a U.S. Army Corps of Engineers activity that will apply the systems approach to the total construction process.

Expected to assume an increasingly important role within the next few years in improving both military and civilian construction techniques, CERL is located in the Interstate Research Park adjacent to the University of Illinois at Champaign.

Operated in facilities leased from the University of Illinois Foundation, CERL was established after an extended study by the Corps of Engineers as a national center for research in systems engineering, construction techniques, materials and equipment.

In addition, CERL will function as a central repository for information conducive to more rapid progress in over-all construction technology. Within a few years, CERL plans to establish a national computerized data bank on construction research information available to all government agencies (U.S. and local) and the construction industry in general.

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Rowny Designated DCRD As Successor To Coffin

(See story on page 7)



Maj Gen Edward L. Rowny

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AFRRI Nears End of 8-Year Construction Program

Armed Forces Radiobiology Research Institute (AFRRI) construction of facilities envisioned when it was established as a tri-service element of the Defense Atomic Support Agency in 1961 is nearing completion.

Representing an investment of approximately $12 million, divided almost equally in buildings and equipment, AFRRI is located on a 242.4-acre site of the National Naval Medical Center, Bethesda, Md.

Phase IV of the 8-year construction program is expected to be completed in late October or early November, but no definite date had been set for dedication ceremonies as the *Army R&D Newsmagazine* went to press.

Approximately 70 percent of the Phase IV addition, a 4-story modern architectural structure providing

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Services OK First Design of Mobile Power Source



INTERSERVICE APPROVAL was given recently to design of a Family of Mobile Electric Power Sources (FMEPS) by a team of technical experts representing all military services. Seated (l. to r.) are Charles L. Price Jr. (Navy); James E. Griffin, technical director of the DoD Project Manager's Office, Mobile Electric Power; Col Joseph J. Rochefort Jr., project manager; Hugh Cramer (Air Force); and George Upchurch (Marine Corps). Standing (l. to r.) are James T. Kennedy (Navy), Clarence E. Guthrie (Army), Paul Blum (Army), Jack R. Cannady (Navy), Dave R. Goebel, Edward Prada, Laurence J. Huysman and Charles L. Rahm, all of the Army. (See story on page 52.)

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Army R&D Newsmagazine

Vol. 10 No. 7 • Aug.-Sept. 1969

Editor Clarence T. Smith
Associate Editor George J. Makuta

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Purpose: To improve informal communication among all segments of the Army scientific community and other Government R&D agencies; to further understanding of Army R&D progress, problem areas and program planning; to stimulate more closely integrated and coordinated effort among Army R&D activities; to express views of leaders, as pertinent to their responsibilities, and to keep personnel informed on matters germane to their welfare and pride of service.

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DDRE Discusses University-Defense R&D Ties

Director of Defense Research and Engineering Dr. John S. Foster Jr. viewed fundamental issues involved in the continuing display of dissidence on campuses of the nation's educational institutions in a recent address to the American Nuclear Society at the Pacific Science Center. His thoughtful message, as follows, merits profound consideration.



Dr. John S. Foster Jr.

All of us are interested in universities. And all of us are concerned in some way, with our nation's security.

Do you recall the time when a campus terror was a professor who was a tough grader? All of us recall the times during the past few years when Red Guards were unleashed in China, and Red divisions unleashed into Czechoslovakia.

Tonight I want to pull some of these strands together and talk about universities and defense research and development. Both subjects are complex. The connection between them—indeed, their *natural mutual dependence*—is perhaps even more complex.

This natural, mutual dependence rests directly on the goals of universities, and on the needs for national security. To be successful, universities require freedom. To ensure freedom, national defense requires the advanced technology often pioneered by universities. This is the simple, strong, mutual bond about which there should be little debate.

But we must look beneath the surface, look at the detailed balancing of interests, look at the issues which could break the bond, look at the process by which the issues are resolved. Let me begin this discussion by characterizing the current situation and stating my premises.

The campuses are the center of our attention today. I recall a decade or more ago when some campuses seemed too silent, and many tried to diagnose a "silent generation." Today we try to understand a generation gifted at confrontation, and fierce with demands—demands for educational reform—demands for re-evaluation of national priorities—demands for a greater student role in making decisions at all levels in the university and government.

The demands lead to debates on many issues—foreign policies, Defense programs, civil rights, poverty, housing, taxes. The debates are healthy, and many of the demands are reasonable. As the debates proceed, as the demands are debated, we must not lose sight of two premises which, at least for me, are fundamental.

First, national security is essential for the nation's future economic and social progress. Further, research and development is the leading edge that keeps our defense capability modern. Without advanced technology, our security would not be assured for long. Any discussion of the university s role in defense R&D must take full account of this fact.

Second, universities help set the substance and tone of the nation's intellectual progress, and provide the basis for political, economic, social and technical advance. They train our leaders and citizens.

The nature of our universities' goals, the quality of their scholarship and education, their academic freedom, which epitomizes the essential freedoms in our society, and the university's involvement in major public problems—all of these are, fundamentally, just as important to our future welfare as the effectiveness of our nuclear deterrent. To put it simply, we try to deter war only to protect what we have built and what we are building.

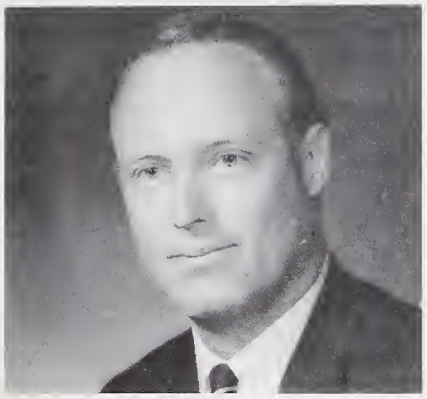
Thus the nature of the mutual dependence of universities and national security is profoundly significant. While this dependence is age-old, the events of the mid-20th century have dramatized and underscored its importance.

The massive involvement of academically oriented scientists and engineers in national security work began, of course, in World War II. Led by the distinguished men associated with special war-time organizations, research and development was part of the national triumph.

Immediately after the war, the country faced key decisions about its national research capability. Should the war-time scientific organizations be maintained? Would we need a substantial continuing research and de-

(Continued on page 46)

Nixon Appoints Fox Assistant SA (I&L)



J. Ronald Fox

Dr. J. Ronald Fox, known as a specialist in management information systems, nuclear weapons and the weapons acquisition process, is the new Assistant Secretary of the Army for Installations and Logistics.

President Richard Nixon nominated Dr. Fox on the basis of both his military and civilian experience. As a Navy officer from 1953 to 1957, Dr. Fox was assigned as a nuclear specialist on the staff of the Inspector General in Europe and the Far East.

From 1959 to 1963, when he became Deputy Assistant Secretary of the Air Force for Management Systems, Dr. Fox cofounded and served as vice president and general manager of Management Systems Corp.

In 1965 Dr. Fox became associate professor of business administration at the Graduate School of Business, Harvard University. Since then, in addition to teaching, he has served as a consultant to the Office of the Secretary of Defense, Office of the Secretary of the Air Force, the Navy Special Projects Office (Polaris), and industry defense and aerospace firms.

$80 Million Contract Calls For Safeguard System R&D

Obligation of $80 million for continued Safeguard antiballistic missile defense system research and development, as part of a one-year $249,649,444 development contract, was announced recently by the Department of Defense.

This contract modification with Western Electric Co. covers continuing subsystem tests at White Sands (N. Mex.) Missile Range, and Kwajalein Missile Range in the Marshall Islands in the Pacific; Spartan and Sprint missile and support equipment tests; and radar systems and component tests and development.

Edgewood Arsenal Dedicates 5th New Lab in 21 Months

Dedication of the $2.3 million Harry C. Gilbert Building July 16, memorializing a colonel who served as director of quality assurance from 1956 until his death in August 1966, gave Edgewood (Md.) Arsenal its fifth major new research facility in 21 months.

Other impressive additions that have enhanced Edgewood Arsenal capabilities as a major Army research, development and test center are:

- The $3.2 million headquarters and principal laboratory of the U.S. Army Environmental Hygiene Agency, charged with a mission of worldwide importance, dedicated Oct. 3, 1967.
- The Amos A. Fries Building, built at a cost of $3 million to house 53 specially designed and equipped chemical labs, dedicated July 27, 1968.
- The $4 million Tandem Van de Graaf Accelerator Facility, dedicated Sept. 25, 1968.
- The $4.1 million John R. Wood Building, containing 62 clinical research labs and 78 support labs, dedicated Oct. 16, 1968.

Brig Gen William W. Stone Jr., director of Chemical, Radiological, Biological and Nuclear Operations, Office of the Assistant Chief of Staff for Force Development, HQ DA, gave the dedicatory address.

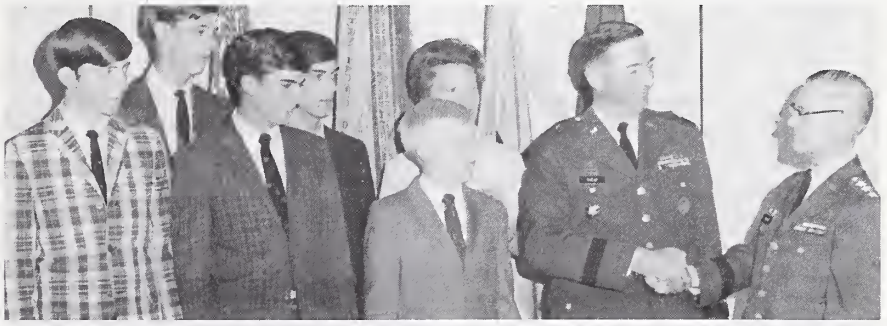
Col Harry C. Gilbert was eulogized as "an outstanding soldier . . . and a proven leader in the field of chemical service . . . [who made] a great contribution in the development of quality assurance."

Termed a "vital link" in the development of chemical compounds and related protective materials, the Harry C. Gilbert Building, it was stated, provides testing facilities necessary to assure that production is in accordance with specifications. It is intended to assure that chemical stocks remain effective, reliable, safe to store, transport and use.

Graduated from Johns Hopkins University in 1935, the late Col Harry C. Gilbert was commissioned in the Army Corps of Engineers. He entered the Chemical Corps in 1947 and served in various key capacities up to his death.



DEDICATION of Harry C. Gilbert Building was attended by the late colonel's mother, Mrs. Harry C. Gilbert; Col Paul R. Cerar (left), commanding officer of Edgewood Arsenal; and Brig Gen William W. Stone Jr., director of CBR and Nuclear Operations, Office of the Assistant and Chief of Staff for Force Development.



NEW BRIG GEN GEORGE M. SNEAD JR., Director of Army Research, is congratulated by Army Chief of R&D Lt Gen A. W. Betts, who pinned on his stars Aug. 1 with the aid of Mrs. Snead. Sharing pride in the occasion are sons (l. to r.) Bill, Jack, Mike, Jim and Ned. General Snead was inducted into the Army in 1943 after graduating from Virginia Military Institute with a BS degree in electrical engineering. Commissioned through OCS Sept. 14, 1943, he entered the University of Illinois following World War II service and in 1948 received an MS degree in communications engineering. He earned his doctorate in physics from the University of Virginia in 1953. General Snead has had many key R&D assignments. He is a graduate of the Command and General Staff College, and National War College.

Engineers Dedicate Construction ER Lab

(Continued from page 1)

Lt Gen Frederick J. Clarke, who assumed duties Aug. 1 as Chief of Engineers, spoke at dedication ceremonies in the laboratory. CERL was established, he said, to strengthen the Corps of Engineers over-all construction program, including military and civil works projects.

"The total systems approach," he explained, "allows diverse groups, working together, to understand . . . construction problems and needs.

"Through better communications and understanding afforded by systems analysis, we can detect and usually eliminate the blind spots which often blur the vision of those parties concerned with construction problems—the owner, architect-engineer and the builder.

"If handled properly, systems approach can solve many problems before they are set in steel and concrete."

CERL is operational on a limited basis but will not become fully operational for at least two years, depending upon completion of a 3-phase construction program. The first phase provides about 100,000 square feet of laboratory space and administrative offices. Other phases will give the completed CERL about 265,000 feet of floor space and a 100-acre test area.

Currently CERL has a staff of about 70 employes, consisting mainly of personnel moved from the Corps of Engineers Construction Engineering Laboratory of the Ohio River Division and personnel from the Office of the Chief of Engineers. Ultimately (estimated about 1972), staffing will increase to 260.

CERL is committed to a policy of working with all construction and engineering research laboratories throughout the nation—Department of Defense, other U.S. Government agencies, and those serving public as well as private interests.

Among goals set for CERL is to seek better ways of construction (not to compete with industry in development of new materials, however) to lower maintenance costs "through built-in preventive maintenance and modernization that would greatly reduce the rate of obsolescence."

Selection of the University of Illinois Foundation for operation of CERL followed an extensive study of proposals from 46 educational institutions throughout the United States. Assistance was provided by the Building Research Advisory Board, National Academy of Sciences.

A few CERL personnel will work part of their time in the laboratory and part with the university, teaching in areas of construction engineering, theoretical and applied mechanics, architecture and business.

In his dedication speech, Maj Gen Clarke paid "special tribute to Harry Zackrison of my own staff. He first asked the National Academy of Sciences to help define the character and scope of research needed to support the Army's future military construction mission.

"Three considerations were paramount in the decision to establish the laboratory: 1) the Army's long-range research programs; 2) the Army's intermediate engineering investigations; and 3) research for other agencies for which the Corps of Engineers performs construction, and those engaged in the large public works programs of the nation."

General Clarke also acknowledged appreciation to Army Chief of Research and Development Lt Gen A. W. Betts and members of his staff for guidance on establishing CERL.

AUSA Slates Vance to Get Marshall Medal

Presentation of the George Catlett Marshall Medal to Cyrus R. Vance will climax the Association of the United States Army annual meeting in Washington, D.C., Oct. 13–15.

Recognizing outstanding service to the nation, the medal is the highest award made annually by the AUSA. Since 1960 recipients (listed in order) have been Robert A. Lovett, John J. McCloy, General Dwight D. Eisenhower, Gordon Gray, General Omar Bradley, General Jacob L. Devers, former President Harry L. Truman, Henry Cabot Lodge and General Maxwell D. Taylor.

Former Deputy Secretary of Defense Vance, who also has served as Secretary of the Army and general counsel to the Department of Defense, was presented the Medal of Freedom, the nation's highest civilian award, in Washington, D.C., Jan. 20, 1969.

The Marshall Medal and the Freedom Medal awards to Vance are for outstanding service during the past eight years. In February, 1969, he returned from nine months service as deputy chief of the U.S. negotiating team at the Paris peace talks.

Vance also was head of the U.S.–United Nations–NATO delegation which avoided a Greek-Turkish war over Cyprus in 1967. In 1968 he went to Seoul, Korea, to negotiate expansion of U.S. military aid after the Pueblo incidient. He participated that same year in the U.S.–Korean–Honolulu conference on the Vietnam War. In 1967 and again in 1968, he headed federal efforts during riots in Detroit and Washington.

USAAMCA Scientist Coauthors Paper for Austrian Symposium

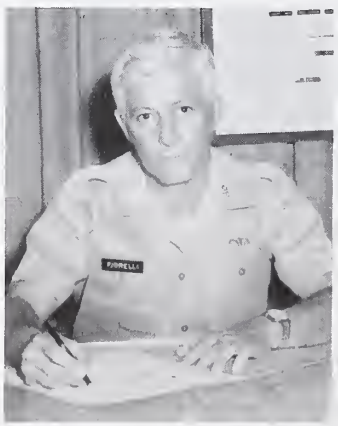
One of the featured technical papers at the Second International Symposium on Electrosleep and Electroanaesthesia, Sept. 8–13 in Graz, Austria, was coauthored by Dr. John P. Martinek, U.S. Army Advanced Materiel Concepts Agency, and Dr. Robert Cohn, director, EEG Department, National Naval Medical Center.

Dr. Martinek, a general physical scientist in the Exploratory Evaluation Division of the USAAMCA, presented the paper and also chaired a technical session on "The Influence of Electrical Currents on the Central Nervous System." This is an area of research in which the U.S. Army has done pioneering research started approximately 10 years ago.

The title of the paper on which he collaborated with Dr. Cohn is "Distortions of EEG Tracings Recorded Simultaneously from the Cortex and Scalp with Special Reference to Sleep."

Dr. Martinek graduated from Vienna and Harvard Universities and has authored or coauthored more than 150 publications in professional journals on such diversified fields as aeronautics, biophysics, mathematics and underwater acoustics.

Fiorelli Commands Pentagon Communications Center



Lt Col M. C. Fiorelli

The U.S. Army's most modern and computerized communications terminal, located in the Pentagon, HQ Department of the Army, is now commanded by Lt Col Michael C. Fiorelli.

Providing support to the Joint Chiefs of Staff, Secretary of Defense and the Defense Intelligence Agency, the U.S. Army Strategic Communications Command's Pentagon Telecommunications Center is a marvel of worldwide capability for fast transmission of information.

Lt Col Fiorelli was until recently assistant chief of staff, Plans and Programs, USASTRATCOM Pacific, and earlier was in Vietnam as J–6 for the Military Assistance Command. He has a BS degree in military sciences from the University of Maryland.

Dr. Tucker Assigned as Principal Deputy DDRE

(Continued from page 1)

parture to join Toro Manufacturing Corp. as vice president for research.

Prior to transferring to the Department of Defense, Dr. Tucker was director of research for four years with International Business Machines (IBM) Corp. His new responsibilities make him the first-line assistant to Director of Defense Research and Engineering Dr. John S. Foster Jr. in supervising Department of Defense R&D activities.

In August 1962, Dr. Tucker was appointed to the Advisory Committee for Economic and Manpower Studies of Science and Technology, National Science Foundation. Since August 1964, he has served on the Committee on the Economic Impact of Technology, U.S. Department of Commerce.

Elected a member of the Directors of Industrial Research in 1964, he also has been a member of the Advisory Board of Birch Wathen School, New York City, since September 1963. Graduated from Columbia College in 1947, he received his PhD degree in physics from Columbia University in 1953. He is a member of Phi Beta Kappa, Sigma Xi, the American Physical Society and the Institute of Electrical and Electronics Engineers.



Dr. Gardiner L. Tucker

Agencies Set Target Dates For Actions on AR-70-35

Target dates for specific actions required by Army Regulation 70–35, as pertaining to a number of major Army programs, were drawn recently in conferences of Army Materiel Command and Army Research Office representatives.

The Army Materiel Command is scheduled to submit by Sept. 30 the manuscript for publication of DA Pamphlet 70–20, Qualitative Requirements Information Manager's Guide. Not later than Mar. 31, 1970, the AMC will complete preparation of DA Pamphlet 70–21–1, QRI Manager's Guide to Automated Procedures.

Another Materiel Command responsibility is to provide a planned schedule for Qualitative Research Requirements Information (QRRI) for publication of Volume 1 in a QRI series.

The QRI Manager's Guide is intended to explain how the QRI program works, how to register would-be contractors, and to present a list of QRI officers, managers and supplemental guidance.

Coupled with the Guide to Automated Procedures, this information will simplify the task of prospective contractors seeking to do research or development for the Army.

Under the plan approved, the AMC QRI Data Bank (RODATA) will become the Army QRI Data Bank. Currently about 75 percent complete, the data bank will contain a list of qualified organizations and the problems on which the Army needs R&D assistance.

Data now on punch cards and magnetic tape will be prepared in form for feeding into a Model 360 computer, thereby facilitating the process of preparing a procurement package for contractors. The bank also will store names of would-be contractors having expertise in specific areas, to assist installations seeking such capabilities.

AR 70–35 pertains to and describes such major Army activities as the Military Themes Program, Unfunded Study Program, and Advanced Planning Briefings, in addition to Qualitative Requirements Information.

Col Walton Takes Command of R&D Group, Far East

Assignment as commander, U.S. Army Research and Development Group (Far East), Camp Zama near Tokyo, Japan, recently returned Col Bryce Calvin Walton to a region where he has served three tours.

Col Charles W. Cook completed more than a 4-year tour in that capacity and has been assigned to HQ U.S. Army Materiel Command, Washington, D.C., as chief, Chemical-Biological-Nuclear Division. Col Thomas E. Marfing, his predecessor in that office, has retired from active duty.

Col Cook served three years with the Life Sciences Division. U.S. Army Research Office, Washington, D.C., prior to departure for Japan.

Col Walton is qualified for his new duties as a supervisor of medical research, although he will be concerned with other research areas, from the view of one who served first as an enlisted man and for 19 years as an officer in the Medical Service Corps.

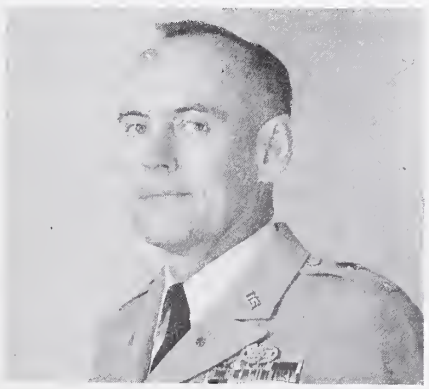
Enlisted in the National Guard in 1940, he served from 1943 to 1946 as a medical sergeant with an Infantry division in the Far East. In 1950 he was commissioned in the Medical Service Corps as a second lieutenant. After earning BS and MS degrees in zoology from the University of California, he went to Japan with the 115th Medical Battalion as an ambulance platoon leader. He became commander when the battalion was sent to Korea.

Returned to the U.S. in 1952, he served until 1956 as a research parasitologist at Walter Reed Army Institute of Research, Washington, D.C.

Under the Army's advanced study plan, he attended the University of Maryland during this period and received a PhD degree in medicine. Then he was assigned until 1959 as chief, Department of Medical Zoology, U.S. Army Medical Research Department, Far East.

Following a 3-year tour as chief, Parasitology Division, 3d U.S. Army Medical Laboratory, Fort MacPherson, Ga., during which he continued his research, he served a year with the Army Medical Research Unit, Medical R&D Command. His next assignment as CO, U.S. Army Medical Research Unit Panama, carried through to his new duties in Japan.

Col Walton has written extensively on his medical research and is the author of several books and technical papers. His professional affiliations include the Society of American Parasitologists, the American Society of Tropical Medicine and Hygiene, the Society of Systematic Zoology, and the American Microscopic Society.



Col Bryce C. Walton

Civilian Applications Increasing for Army Night-Vision Devices

Army research, as a general policy, is oriented toward established military objectives, even when the search for new basic knowledge that may help to serve this purpose may not be as clearly definable as is desirable. But byproduct benefits for civilian use continue to proliferate.

One of the prime examples is the Army's new family of night-vision devices, long one of the most zealously guarded secrets of the enhanced fighting capabilities of U.S. forces in Vietnam. Publicized only late last fall, these devices are prompting numerous civilian applications.

Since the *Army Research and Development Newsmagazine* publicized the first example of this civilian use ("Night-Vision Aids Used in Efforts to Save Cattle," March 1969 edition, page 1), the Army has been getting requests for loan of night-vision equipment for research projects.

The cited article told how two of the Army's newest light amplification night-vision devices are on loan for a United Nations Food and Agricultural Organization-supported study to try to control the scourge of vampire bats on cattle in Latin America, where the problem is of critical importance.

The newest request to the Director of Army Research is for loan of two Starlight Scopes and one crew-served weapon sight to the Research Corp. of the University of Hawaii.

Dr. Howard H. Vogel Jr. of the University of Tennessee has been engaged by this research organization to conduct a study of the ecology of the Coconut Crab on Eniwetok Atoll, where natives vacated for the atomic bomb tests are being returned to their homeland.

The Coconut Crab is an important part of their diet. Consequently, knowledge on how to propagate and harvest them with maximum efficiency is of economic concern. Dr. Vogel's objective is to report findings, through studies of the crabs at night by use of the Army's nightvision devices, that will aid in drafting regulations on crab harvesting.

Actually, loan of the night-vision equipment is being made to Winston E. Banko of the U.S. Bureau of Sport Fisheries and Wildlife. He will loan the equipment to Dr. Vogel for 30 days (Aug. 15 to Sept. 15) and then use it personally to perform longer-term research on endangered wildlife species in the area.

Several wildlife species are in danger of becoming extinct unless proper protective measures can be taken, the Bureau of Sport Fisheries and Wildlife has been informed. Before such action can be taken, additional knowledge is needed regarding their habits—knowledge that can be gained by nocturnal observations, hence the night-vision devices.

Among the birds and mammals whose existence is threatened, according to information given to Dr. Arthur J. Emery Jr., a biologist with the Life Sciences Division of the Army Research Office, Office of the Chief of Research and Development, HQ DA, are several species of owls, the Newell Shearwaters and the Dark-Rumped Petrells. Dr. Emery has been serving as Army action officer in arranging N-V equipment loans.

Loan of the equipment is coordinated through the commanding general of the U.S. Army Materiel Command. The AMC Office of the Project Manager for Night Vision has under consideration a request for seven additional Starlight Scopes for use by the U.S. Bureau of Sports Fisheries and Wildlife to be conducted on Puerto Rico as well as in Hawaii.

Another request has been filed on behalf of the U.S. Department of State for use by its Agency for International Development. The proposal calls for AID to conduct studies of the habits of Vampire bats in Mexico, to supplement the studies reported in the March 1969 edition of the *Army Research and Development Newsmagazine*. The loan is being arranged to the Bureau of Sports Fisheries and Wildlife at Denver, Colo.

WRAMC Appoints Col Howard as USAIDR Director

Appointment of Col Richard L. Howard as director, U.S. Army Institute of Dental Research, announced by Walter Reed Army Medical Center, Washington, D.C., followed a year of duty as chief of the institute's Division of Preventive Dentistry.

Backed by a 24-year career as a surgeon in the U.S. Army Dental Corps, during which he has had key assignments in Germany, Korea and Japan as well as in the United States, Col Howard has a master of public health degree from the University of California at Berkeley, and BS and DDS degrees from the University of California at San Francisco. He is also a graduate of the Army Command and General Staff College and of the Army War College.



Col Richard L. Howard

Among his professional affiliations are membership in the U.S. Army Medical Department Committee on Preventive Dentistry, American Dental Association, American Public Health Association, American Association of Public Health Dentists, and the American Board of Dental Public Health (as a Diplomate).

Truex Assigned as Special Assistant to CG at ECOM

Special assistant to the commanding general of the Army Electronics Command for Aviation and Aviation-Electronics recently became the new assignment of Lt Col Raymond W. Truex Jr.

Col James L. Burke left that position to assume command of the Electronic Warfare and Combat Surveiliance School, Fort Huachuca, Ariz. Col Truex had served as his special deputy assistant.

Col Truex, who has a senior Army aviator rating, is also commander of the Army Aviation Detachment, Army Electronics Support Command, Naval Air Station, Lakehurst, N.J. He began his military career in 1943, enlisting in the Army Air Corps.

In 1965, he was assigned to the Army Concept Team in Vietnam as a communications-logistics officer. Upon return to Fort Monmouth, he served as acting chief of the Avionics Configuration Control Facility until assigned to the Office of the Special Assistant for Aviation and Aviation-Electronics in 1967.



Lt Col R. W. Truex Jr.

Rowny Designated DCRD as Successor to Coffin

Army Deputy Chief of Research and Development designee Maj Gen Edward L. Rowny is scheduled to report for duty Sept. 2, filling a position vacant since Maj Gen Robert E. Coffin's departure Mar. 30 to become CG, Southern European Task Force.

Assigned since August 1968 as Deputy Chief of Staff, United States European Command, he earlier served two years as DCS/Logistics, HQ U.S. Army Europe. Graduated from the U.S. Military Academy in 1941, he has distinguished himself in combat and in major staff assignments as the recipient of a long list of citations, decorations and awards.

In 1965–66 he was CG of the 24th Infantry Division, following assignment from November 1963 to June 1965 as Deputy Assistant Chief of Staff for Force Development, Washington, D.C., after serving five months as special assistant for Tactical Mobility.

Other assignments since 1955 are listed in his military record as student, Armed Forces Staff College; deputy secretary and then secretary of the staff, Supreme HQ Allied Powers Europe, until August 1958; student, National War College; Army member, Chairman's Staff Group, U.S. Army Element, Office of the Joint Chiefs of Staff, 1959–61; Chief, Army Concept Team in Vietnam, 1961–62.

General Rowney served early in World War II as CO and later S–3 of the 41st Engineer Division, Fort McClellan, Ala., then as a member of the cadre of the 92d Infantry Division, followed by assistant division G–3 and commander, 317th Engineer Combat Battalion.

After attending the Command and General Staff College at Fort Leavenworth, Kans., he took the 317th Engineer Combat Battalion to Italy. Late in 1944 he was assigned to command an Infantry battalion and subsequently a regimental task force of the 92d Division.

Assigned to the Operations Division, War Department General Staff in Washington, D.C. (1945–47), he worked on strategic plans leading to completion of the war against Japan and on design of the postwar Army.

In 1949 he received a master's degree in international relations and civil engineering from Yale University and was then assigned to the Far East HQ, U.S. Army, as a planning officer.

During the Korean Conflict, General Rowny helped plan the Inchon Invasion and was official spokesman for General Douglas MacArthur. In positions as X Corps Engineer, Corps G–4, executive of the 38th Infantry Regiment 8d Infantry Division, and as 38th Regiment CO, he fought in seven campaigns.

Following return to the U.S. in May 1962, he attended the Basic Airborne Course at Fort Benning, Ga., qualifying as a parachutist, and served as chief, Advanced Tactics Group and later as assistant director, Tactical Department.

Born in Baltimore, Md., Apr. 3, 1917, he received a BS degree in civil engineering from Johns Hopkins University prior to enrolling at the U.S. Military Academy in 1937.

Among his honors are the Silver Star (w/2 OLC), Legion of Merit (w/3 OLC), Bronze Star Medal, Air Medal, Army Commendation Medal (w/OLC), American Defense Service Medal, American Campaign Medal, European-African-Middle Eastern Campaign Ribbon (w/2 BS), Korean Service Meal (w/7 BS), United Nations Service Medal, Republic of Korea Presidential Unit Citation, and the Cross of War Merit (Italy).

Army Sets 15th Conference on Design of Experiments

(Continued from page 1)

ity." Dr. Clifford J. Maloney, Biometrics Section, Department of Health, Education and Welfare, National Institutes of Health, will discuss "A Probability Approach to Catastrophic Threat."

Featured also is "The Empirical Bayes Approach to the Design and Analysis," a presentation to be made by Prof. Richard G. Krutchkoff, Virginia Polytechnic Institute at Blacksburg, Va. The final invited address will be given by Dr. S. C. Saunders, Boeing Co., on "Confidence Limits for Performance of a System When Few Failures Are Encountered."

Army scientists will present approximately 20 technical papers.

One of the conference highlights will be the presentation of the Wilks Memorial Medal, given annually in recognition of an outstanding contribution to advancement of scientific or technical knowledge in Army statistics. The award is administered by the American Statistical Association. Conference Chairman Dr. Frank E. Grubbs, Aberdeen Research and Development Center, will announce the award at the banquet on the evening of Oct. 23.

The conference is sponsored by the Army Mathematics Steering Committee, chaired by Dr. Ivan R. Hershner Jr., chief, Physical and Engineering Division, Office of the Chief of Research and Development, HQ Department of the Army.

ECOM Appoints Dr. Garbuny to Advisory Group

Dr. Max Garbuny is the newest appointee to the Army Electronics Command's 10-member Electronics Advisory Group.

Dr. Garbuny is on leave from Westinghouse Electric Corp. for the academic year 1968/69, to serve as New York State visiting professor of optics at the University of Rochester's College of Engineering and Applied Science.

The Electronics Advisory Group is composed of leaders from universities, industry and professional societies who advise the commanding general on scientific, technical and other matters relating to ECOM's mission.

A consultant to the Army Scientific Advisory Panel (ASAP) and a member of several other government sponsored committees, Dr. Garbuny has been with Westinghouse Corp. since 1944. He has a doctorate in physics from the Technical University of Berlin (1938) and has done research in optical physics, infrared technology, low-temperature physics, and solid-state and microwave devices.

Granted patents for inventions in all these fields, he has developed various microwave devices, infrared detectors, thermal imaging systems, and measurement techniques in optics and spectroscopy. Since 1959 he has presented summer courses at the University of California, Los Angeles, in the areas of infrared, optical physics and modern physics. He has published papers and reports in all his fields of research and is the author of *Optical Physics*, (Academic Press, 1965), and coauthor of *Science of Science* (Walker, 1963) and *Seven States of Matter* (Walker, 1966).



Dr. Max Garbuny

AFRRI Nears Completion of 8-Year Facilities Program

(Continued from page 1)

about 36,000 square feet of floor space, will accommodate laboratories to replace long-used temporary facilities. Some of AFRRI's 200 military and civilian scientists have had to use trailer facilities for as long as five years.

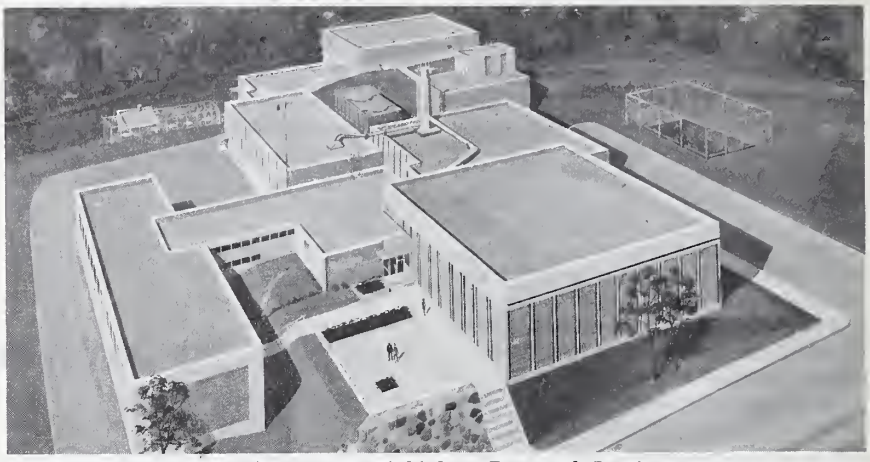
When the addition is ready for occupancy, AFRRI will have more than 116,000 square feet of laboratory and office space, including an enlarged library, adequate conference rooms and a variety of radiation research capabilities to support an extensive program. AFRRI also conducts numerous technical information and educational activities.

Among impressive parts of Phase IV, in which AFRRI scientists have contributed to design, is a 500,000-Curie gamma ray producing Cobalt-60 facility, representing a substantial part of the total investment of about $1.6 million in the addition. Initial strength of 50,000 curies is expected to be increased tenfold as the AFRRI research program develops.

Other radiation sources provide AFRRI with a varied research capability believed unexcelled in the Free World for biomedical investigations.

Included are short-lived radioisotopes produced in-house; 250 and 300-kvp Maritron X-ray units; a TRIGA Mark F nuclear reactor with both pulse and steady-state operating modes; a Positive Ion Accelerator (PIA) used as a neutron generator; and an Electron Linear Accelerator (LINAC) designed specifically to meet AFRRI research requirements.

AFRRI's official mission statement is: "To conduct scientific research in the field of radiobiology and related matters that is essential to the medical support of the United States Military Services, to national welfare, and to the well-being of mankind."



Armed Forces Radiobiology Research Institute

Civilian and military researchers conduct investigations in behavioral sciences, physical sciences, experimental pathology, and radiation biology. Biological systems other than man are placed in limited radiation environments and are studied in a precise program of experimentation. "Sam," a tissue-equivalent plastic model, is used to simulate man in size and composition for some investigations.

Twenty closed-circuit television cameras, video tape recordings and various electronic devices are used to monitor experiments and to record data in form for rapid dissemination to AFFRI's staff and other agencies.

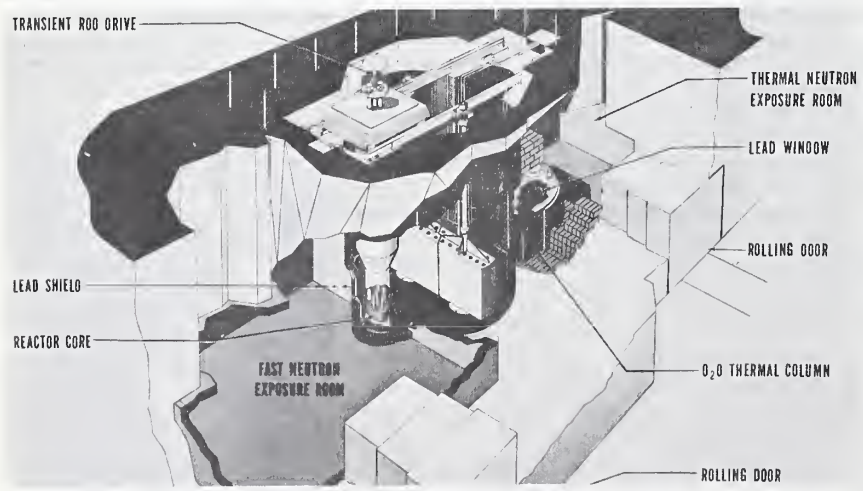
Military application is the primary objective of AFRRI's continuing search for new knowledge on radiation effects to develop protective and therapeutic measures. However, one of the auxiliary benefits is the knowledge of how to use controlled, safe amounts of nuclear energy for medical treatment of civilians.

Under the AFRRI mission, the director is authorized to make facilities available to qualified personnel from other organizations for independent research and study as deemed appropriate, on a cost-reimbursable basis.

U.S. Government agencies that have done collaborative work at AFRRI include Walter Reed Army Institute of Research (WRAIR), the School of Aerospace Medicine, Brooks Air Force Base, Tex., U.S. Food and Drug Administration, National Institutes of Health, the U.S. Treasury Department, and others. The University of Pennsylvania School of Medicine has used AFRRI's ion accelerator for cancer research. Similar arrangements have been made with other universities.

Exposure rooms used in conjunction with AFRRI radiation sources are designed for maximum safety to confine the radiation fields produced for several types of experimentation, varying widely in time and intensity of dosimetry. Walls are as much as 12 feet thick in some places and each of the doors of the four rooms weighs between 36 and 50 tons.

The AFRRI directorate, consisting of one representative each from the Army, Navy and Air Force, and a senior civilian supervisory scientist, with the position of director alternated among the services, receives guidance from a board of governors. The board consists of the director of the Defense Atomic Support Agency as chairman and the Surgeon Generals of the three services. The board meets as necessary to review AFFRI's current and planned programs.



Triga Mark F Reactor System

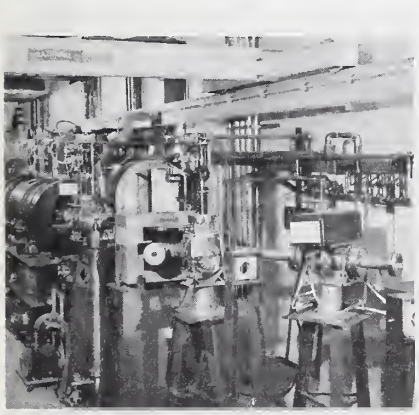
COL HUGH B. MITCHELL, AFRRI's director, has served since Aug. 31, 1967. He has had extensive training and experience in clinical medicine and radiobiology, serving as a civilian and military medic in hospitals throughout the United States. He became assistant deputy director of AFRRI in 1965.

Col Mitchell has an MD degree from Louisiana State University and a master's from University of California, Berkeley. He is a member of the American Medical Association, Aerospace Medical Association, Association of Military Surgeons, Health Physics Society, Society of Nuclear Medicine, Radiation Research Society, and the Society of U.S. Air Force Flight Surgeons.

DR. HAROLD O. WYKOFF, an internationally known radiation research scientist, has served as AFRRI deputy director for science since August 1966. He is recognized for his work on a variety of radiological research problems, especially X-ray, and was with the National Bureau of Standards for a quarter century (dating to 1941) until he transferred to AFRRI. At the NBS he was responsible for international comparison of national X-ray standards.

Graduated from the University of Washington with BS and PhD degrees in physics, he is a member of the Radiological Society of North America, American Association of Physicists in Medicine, American Physical Society, Health Physics Society, Radiation Research Society, Philosophical Society of Washington, and American College of Radiology.

COL ADAM E. ADAMS was appointed AFRRI deputy director for operations May 1, 1969, but has been with the institute since 1967 as head of the Military Analysis Department. In this capacity, he provided an important link in radiological research between military commanders in the field and AFRRI research scientists.



Electron Linear Accelerator



FROM LEFT: Col Adams, Col Mitchell, Dr. Wyckoff and Cmdr Vaaron

Among his responsibilities is providing liaison with HQ Defense Atomic Support Agency, the Atomic Energy Commission, National Institutes of Health, other federal agencies, colleges and universities, and the general scientific community. He has a BS degree in anatomy from Ohio State University, master's in hospital administration from Baylor University, and MS degree in public health from University of North Carolina.

CMDR MYRON I. VARON has served since Aug. 31, 1967, as assistant deputy director for science at AFRRI and for two years prior was medical director, U.S. Naval Radiological Defense Laboratory, San Francisco, Calif. From 1960 to 1962, he was senior medical officer and radiation safety officer on the *USS Long Beach*, America's first nuclear-powered surface warship.

Cmdr Varon also served two years with the Armed Forces Special Weapons Project and with the Naval Reactors Branch of the U.S. Atomic Energy Commission (1959–60). He has a bachelor's degree from the University of Chicago, master's and doctorate in radiation biology from the University of Rochester, and an MD in medicine from Northwestern University Medical School.

HFR&D Conference Scheduled Nov. 4-6 at Fort Ord

"Doctrine, Performance and Training for the Army in the Field" is the theme of the 15th Annual Human Factors Research and Development Conference, Nov. 4-6, at the U.S. Army Training Center Infantry, Fort Ord, Calif.

The conference is sponsored by Chief of R&D Lt Gen A. W. Betts with the U.S. Continental Army Command (USCONARC) as host. Activities will be centered at Fort Ord and the Combat Developments Command Experimentation Command (CDCEC) field activities at Hunter-Liggett Military Reservation.

Behavioral and social scientists, engineers and top management personnel representing the Department of Defense, Air Force, Navy, industry and nonprofit organizations, United Kingdom, Canada and Australia are expected at this fifteenth meeting since the Human Engineering Conference was initiated in 1955. The name was changed in 1963 to reflect its broader scope.

The deputy commanding general of the U.S. Army Combat Developments Command (USACDC) Maj Gen L. H. Schweiter, is slated to deliver the keynote address. Maj Gen Philip B. Davidson Jr., CG of the center, will deliver the welcoming address and has arranged for demonstrations of ATC operations at Fort Ord following the keynote address.

Session III will be devoted to "Behavioral Sciences R&D in Support of ATC Operations." Dr. Howard H. McFann, director of the Human Resources Research Office Division No. 3, Presidio of Monterey, will preside.

Session IV on "Behavioral Sciences in Support of Operations in Overseas Environments" will be chaired by Dr. Rudolph G. Berkhouse of the Behavioral Sciences Division, U.S. Army Research Office (USARO), OCRD. This will be followed by a session on "Preparation for Deployment," chaired by Col Edward M. Hudak, HQ USCONARC.

Session VI, "Human Factors in Continuous Operations," will be chaired by Dr. Aaron Hyman, U.S. Army Behavioral Sciences Research Laboratory.

The conference will close with CDCEC field demonstrations at Hunter-Liggett, followed by a summation by Dr. L. E. Baker, conference chairman and Army chief psychologist, Behavioral Sciences Division, USARO.

SATCOM Aids in Providing Apollo 11 TV to Alaska

Alaskan residents enjoyed their first live TV coverage of a major news story during the Apollo 11 moon mission by way of Army SATCOM Agency terminals and the Air Force TACSAT I communications satellite.

Unique can be used properly to describe the relay system devised to achieve this objective. TV signals traveled from Apollo 11 to National Aeronautics and Space Administration ground stations in California. Commercial TV facilities and microwave links relayed signals to HQ, SATCOM Engineering Test Facility, Fort Monmouth, N.J. TACSAT I was used to link with the SATCOM terminal in Anchorage.

The Anchorage station was an AN/TSC–54 terminal flown with its military operating crew from HQ SATCOM to Alaska July 11.

The SATCOM Agency Test Facility station was the Lincoln Experimental Terminal (LET-1), with an AN/MSC–46 terminal as backup, both operated by SATCOM personnel. LET-1 was designed by the Lincoln Laboratory of the Massachusetts Institute of Technology.

In normal use, TSC–54 and MSC–46 terminals form the worldwide ground network of the operational Defense Satellite Communications System. Stations of this system located in Alaska include an AN/TSC–54 at Shemya and an AN/MSC–46 at Wildwood.

Terminals in the Apollo 11 Alaskan TV project (AN/TSC–54, LET-1 and AN/MSC–46) are used by the SATCOM Agency for research and development activities in connection with satellite communications.

TACSAT I, developed for the Air Force Space and Missiles Organization, was launched from Cape Kennedy in February 1969. It is a 1,600-pound synchronous satellite orbiting 22,000 miles above the equator, designed to test the feasibility of tactical satellite communications.



AN/TSC–54 Terminal

The AN/TSC–54 was designed as the quick-reaction terminal for the Defense Satellite Communications System. A complete 23,000-pound terminal—antenna, antenna trailer, operations shelter and power generator—plus its crew can be loaded into a single C–141 aircraft and flown anywhere on earth. A novel feature is its antenna—a Cassegrain type with four parabolas in a cloverleaf configuration measuring 18 feet across.

The AN/MSC–46 was developed for SATCOM Agency and is transportable by aircraft or ground vehicle. The terminal consists of a 40-foot diameter parabolic antenna inclosed in a protective radome, operations unit, cargo and maintenance vans, and power generators.

AMC Employes Draw Anniversary Acclaim, Challenge

Army Materiel Command support of U.S. Forces in Vietnam "will stand tall in military history," General F. J. Chesarek, CG of the AMC, stated Aug. 1, AMC's seventh anniversary.

That praise for achievements of AMC's 177,000 military and civilian personnel was combined with a "second generation" challenge to "consolidate our experience, refine our procedures, and develop new methodologies for difficult tasks which lie ahead."

General Chesarek, in his message to AMC's 180 installations and activities, pledged the command "to prove through performance that it is the master of the sciences of research, development, procurement, distribution and maintenance...The second generation of AMC will be tough, professional, confident and alert."

Army Chief of Staff General William C. Westmoreland sent this message:

"In the difficult task of combining the most recent scientific and technological developments with present and future needs of the Army, you are ensuring that our soldiers are the best equipped in the world.

"While accomplishing this tremendous undertaking, you have reduced the number of project managers and made possible a higher level of responsiveness to requirements from the field. In addition, through your Integrated Logistic Support Planning, we are assured that necessary logistical support and instructions are available when new weapons systems are sent to the field."

Under organizational realignments reported in recent editions of the *Army R&D Newsmagazine*, General Chesarek's span of control was reduced about 60 percent. Instead of the 190 commands, agencies or individuals reporting directly to HQ AMC, there will be 78.

Efforts also are under way to secure suitable office space to consolidate HQ AMC, now scattered in five government-owned facilities and four commercial office buildings, at a single site in Northern Virginia within a 10-mile radius of the Pentagon. The target date for the move is late 1971.

Specific AMC actions during the past 12 months in support of U.S. Forces in Vietnam, and to increase over-all readiness of the Army in the field, ranged from advances in techniques to development and introduction of new or improved weapons and equipment. Cited as examples are:

- *VLAPA (Vietnam Laboratory Assistance Program, Army), established by AMC to provide quick-reaction, in-country scientific and engineering assistance to U.S. Army Forces in Vietnam. AMC laboratory representatives in Vietnam are allowed to levy their parent laboratories for quick engineering solutions to problems they encounter in the field.*
- The newly developed M551 armored reconnaissance/airborne assault vehicle, the General Sheridan, was initially deployed to Vietnam and committed to combat in February.
- *An AMC development project equipped the M113 armored personnel carrier to perform as an assault bridge. Twenty-four units were shipped to Vietnam for operational evaluation.*
- Under AMC direction, Combat Evaluation Tests of five Vulcan Air Defense Weapon systems were conducted in Vietnam. Good results were reported.
- *AMC accelerated development of a 420-gallon-per-hour lightweight water purification unit shipped to Vietnam for battalion-size mobile forces.*
- AMC continued to emphasize its program to employe volunteers for overseas assignments in support of users of Army materiel. As of July 1969, about 500 AMC personnel were in a "ready" position to provide quick reaction assistance when requested by commanders in Vietnam and other overseas areas.
- *In the field of aircraft development, maintenance and armament, the AMC made numerous advances that will directly enhance the Army's combat effectiveness, including a new armament subsystem (XM35) deployed recently for the AH–1G Huecobra helicopter. Later in 1969, a new subsystem (XM59) caliber for 0.50 machinegun, pintle-mounted, is expected to become available for use on the UH–1D or H helicopter.*
- In the final stages of development is the new CH–54B heavy-lift helicopter, an improved version of the CH–54A, which has proved its worth in Vietnam by recovering downed aircraft worth more than the total system cost.
- *Preproduction models of the newest version of the OV–1 Mohawk surveillance aircraft, the OV–1D, have been accepted by the Army for testing. Improvements include interchangeable infrared and side-looking airborne radar surveillance systems, increased engine power, and installation of an inertial guidance system.*
- Turbine aircraft engine overhaul and repair production at the Army Aeronautical Depot Maintenance Center increased by 37 percent during the past year, compared with FY 1968. Production has climbed to an out-

(Continued on page 50)

AMMRC Creates Institute for Advanced Materials, Mechanics, Design

Scientists of international renown will rotate as research Fellows in a new Institute for Advanced Materials, Mechanics and Design to be dedicated in September at the U.S. Army Materials and Mechanics Research Center (AMMRC), Watertown, Mass.

Fellowship appointments to the IAMM&D normally will range from three to six months and an opportunity will be provided to author technical papers or other publications during residency. Twenty or more scientists will be chosen for each rotating group.

Objective of the IAMM&D, which is an element of the U.S. Army Materiel Command, is to gain the benefit of discussions and exchanges of ideas from groups of participants whose achievements in materials and mechanics research have won worldwide acclaim; also, to pool knowledge for research tasks.

Themes for such in-depth research will be established by the IAMM&D. Problem areas under consideration for study are listed as: Fundamentals of Materials Processing; Super-Strength Materials; High-Temperature Materials; Ultra-Fine Grain Materials; Composite Materials; Texturing and Dynamic Behavior of Materials.

Other projected research areas include Hypervelocity Impact and Deformation; Fatigue Stress in Materials; Mechanisms of Failure; Elastic-Plastic Behavior of Materials; Structural Dynamics; Transition Temperatures of Plastics and Elastomers and Organo-Metallic Polymers.

To be considered for appointment as a Fellow at the IAMM&D, a scientist must have demonstrated expertise in research or engineering, and have an affiliation with an academic institution, industrial activity or research institute, or with the Army Materials and Mechanics Research Center.

Financial support for IAMM&D Fellows generally will be provided by their own organizations. However, if a Fellow is associated with an industrial or academic group and full salary is not in effect during the residency at the institute, financial support may be offered. Per diem subsistance and reimbursement for travel to and from their permanent location will normally be allowed.

Dr. Eraldus Scala, AMMRC director, conceived the idea for the institute, which is picturesquely situated in a wooded area of the AMMRC grounds near the Charles River.

Since Civil War days, the massive brick and stone mansion, now converted to fully equipped offices and meeting rooms, had served as the home of the commanding officer of Watertown Arsenal, now closed.



Norman L. Reed



Dr. Eraldus Scala

Executive director of the institute Norman L. Reed, formerly chief of the AMMRC Materials Advisory Group, recently welcomed 29 university professors representative of most sections of the U.S. to a 2-day planning and guidance session.

All of the professors were scientists or engineers employed as consultants to the Army under contract to the Advanced Materials Projects Agency through Battelle Memorial Institute.

Dr. Scala addressed the group on "Concept, Operation and Future Plans for the Institute," expected to serve the interests of improved relationships between the Army R&D and the general scientific communities.

Institute Fellows, in addition to the excellent facilities and the library of the AMMRC, will have visiting privileges at the Massachusetts Institute of Technology, Harvard University and the Boston public libraries, all within a few miles. These universities, as well as Tufts and Northeastern Universities, are available for Fellows to take part in technical seminars.

APG Selects Roane for Study at Harvard University

Under criteria established for participation in the 1969–1970 Educational Program in Systematic Analysis, Lester W. Roane of the U.S. Army Test and Evaluation Command will study one year at Harvard University.

The 34-year-old instrumentation engineer at Aberdeen (Md.) Proving Ground was selected on the basis of his academic record, federal employment experience and a demonstrated capability for development.

Sponsored by the U.S. Civil Service Commission in cooperation with the Bureau of the Budget, the Educational Program in Systematic Analysis is designed to identify and provide top-level training for U.S. Government civilian employes expected to make major contributions to systematic program analysis in their departments and agencies.



Lester W. Roane

Students selected for the program usually are sent in groups of 7 to 15 for a year of study at Harvard, Stanford University, Massachusetts Institute of Technology, the University of Maryland or U. of California.

Lt Gen F. J. Chesarek, GG of the U.S. Army Material Command, congratulated Roane on his appointment in a letter that stated in part:

"This mark of distinction recognizes not only your past contributions but also your potential to make more substantial contributions to the Department of the Army in the future."

Graduated from Virginia Polytechnic Institute in 1958, Roane served seven years with the Range Instrumentation System Office at White Sands (N. Mex.) Missile Range prior to his transfer to the U.S. Army Test and Evaluation Command.

OPO Seeks Increased Participation in Special Career Programs

Substantially increased participation in the Army Officer Special Career Programs, including the now separate Atomic Energy and the Research and Development Programs, is an objective of the Office of Personnel Operations, HQ DA.

Critically needed are specialists in 11 functional areas that do not fall exclusively within the developmental pattern of any single career branch, a recent OPO announcement said. Total membership in these programs was 4,652 as of June 30, 1969.

In most of these specialist areas, a threefold to fourfold increase in participation is desired to meet current assignment requirements, taking into consideration such factors as alternating assignments and the impact of retirement losses.

Excluding Army Aviation, the specialty fields and the membership in each as of the close of Fiscal Year 1969 were listed as follow:

Atomic Energy, 205; Automatic Data Processing, 316; Comptroller, 393; Foreign Area Specialist Training (FAST), 533; Information (Public, etc.), 229; Intelligence, 75; Logistics, 1,665; Operations Research /Systems Analysis, 343; Procurement, 222; R&D, 663; Military Assistance (new field).

Careers of members of any of these programs, it was emphasized by OPO, continue to be managed on a branch basis. Personnel actions are based on a comparative and objective analysis of each officer's entire record.

Program participants, in policy and in practice, receive equal consideration and opportunities for promotions, competive assignments and schooling.

Among prerequisites for voluntary participation is an above-average record of performance—a factor that helps to explain why the ratio of participants promoted is substantially higher than the Army-wide average.

Among purposes of the Officer Special Career Programs are to develop the career potential and interests of participants as well as to utilize properly officers who are particularly well-qualified in certain functional areas of priority importance. Each of the programs is under continuing review and changes are made to meet revised operational requirements of the Army.

For example, the Military Assistance Officer Program was established recently to broaden the scope of the former Civil Affairs Officer Program. This now includes psychological operations and political activities as well as civil affairs.

Except for the FAST Program, which is currently under review to ascertain requirements, two avenues of entry are open to any of the 11 Officer Special Career Programs. Officers may apply in writing to OPO, or anyone in an appropriate position to have knowledge of an officer's qualifications may nominate him, again by sending criteria information to OPO.

Nominations are processed through a selection board that reviews the officer's entire record. If action is favorable, the applicant is enrolled or, in the case of a nomination, is invited to join. When an applicant is not selected, he is notified directly (not through channels). No record is made in his official military file at HQ DA.

OPO points out that being a member of a special career program complements an officer's branch training and experience. Members, instead of becoming "specialists," actually become broader "generalists" than if they confined themselves to career branch assignments.

OPO manages these programs under policies established by the Deputy Chief of Staff for Personnel. Other General Staff elements of HQ DA assist in managing the programs through consultant boards established to recommend policy, designate key positions requiring program members, propose membership selection standards, publicize the programs, and nominate officers for membership.

Officers whose records reflect above-average performance and who have demonstrated skills in any of the special career fields should be nominated or encouraged to apply for membership, OPO stated.

Nominations and applications should be addressed to: Office of Personnel Operations, Attention: OPD-Colonel Division, or appropriate career branch, Department of the Army, Washington, D.C. 20315.

Dr. Duncan Takes Top PL-313 Position as WSMR

White Sands (N. Mex.) Missile Range has announced Dr. Richard H. Duncan's appointment as technical director and chief scientist, filling a PL–313 position vacant since Dr. R. K. Sherburne resigned in 1963.

WSMR Commander Maj Gen H. G. Davisson said Dr. Duncan will function at command level and be responsible for preparation of scientific policy, planning research, development, testing and evaluation activities, and over-all direction of programs.

Associated with New Mexico State University since 1954, Dr. Duncan has served as vice president for research since 1965. Additionally, he has been a consultant to Bell Telephone Laboratories on engineering analysis and radar theory (1957–65), and to other industrial and Federal Government agencies.

Dr. Duncan has a BS degree in electrical engineering and an MS degree in physics from Missouri (Rolla) School of Mines and a PhD degree in physics from the University of Missouri. Nationally known for his work on antenna research and as a university research administrator, he has been involved with the Nike Ajax, Nike Hercules, Zeus and Nike-X missile system development projects.

A vice president for research at NMSU, he exercised general supervision over the Physical Science Laboratory, Engineering Experiment Station, Research Center and the Water Resources Research Institute.

While serving as professor of electrical engineering and physics at NMSU from 1954 to 1965, teaching both undergraduate and graduate courses, he supervised basic research and thesis in electromagnetic theory.

Dr. Duncan was an O. M. Stewart Fellow at the University of Missouri in 1954 and in 1962, was named a Distinguished Professor at NMSU. He is the author and co-author of numerous scientific papers and publications.

In World War II he was a communications officer, U.S. Army Air Force.



Dr. Richard H. Duncan



Maj Gen Walter E. Lotz Jr.



Maj Gen William B. Latta

ECOM, STRATCOM Commanders Exchange Positions

Job swapping will make Maj Gen Walter E. Lotz Jr. CG of the Army Electronics Command and Fort Monmouth, N.J., and Maj Gen William B. Latta CG of the U.S. Army Strategic Communications Command in September.

Graduated as classmates from the United States Military Academy in 1938, General Lotz and Latta have since achieved recognition as two of the U.S. Army's top experts in electronics and communications.

Until assigned as Director of Army Research Oct. 3, 1965, General Lotz was deputy CG of the Electronics Command, where General Latta has been in command since October 1965. General Lotz has been STRATCOM commander since Jan. 31, 1968.

When he returned in September 1966 from a tour of duty in Vietnam as assistant chief of staff, Communications-Electronics, U.S. Military Assistance Command, General Lotz became the Chief of Communications-Electronics, HQ DA, and later the first Assistant Chief of Staff, Communications-Electronics until assigned as CG of STRATCOM.

Graduated from the Universtiy of Illinois with a master's degree in communications engineering, General Lotz earned a doctorate in physics at the University of Virginia.

GENERAL LATTA obtained a master's degree in business administration from Harvard University in 1949, graduating with distinction, and is also a graduate of the Special Course of the Command and General Staff School as well as the Industrial College of the Armed Forces.

Following completion of the ICAF course in 1956, he was assigned as chief, Materiel Maintenance Division, Office of the Deputy Chief of Staff for Logistics, Washington, D.C., until reassigned as Signal officer, HQ Seventh U.S. Army, Stuttgart, Germany.

On Aug. 15, 1962, he started a 3-year tour as deputy chief of staff, Communications and Electronics, HQ North American Air Defense Command and HQ Continental Air Defense Command, Colorado Springs, Colo.

General Latta was signal officer of the Western Task Force which, under the leadership of General George Patton, made the D-Day landing at Casablanca Oct. 10, 1942, and subsequently commanded the 1st Armored Signal Battalion at Casablanca.

In February 1945, he became chief, Communications Division, HQ Seventh U.S. Army, serving in the Rhineland and Central European campaigns. He became signal officer, XXI Corps in Germany in May 1945, serving until returned in April 1946 to the Organization and Training Division, War Department General Staff, Washington, D.C.

WECOM Establishes Office For Test, Diagnostic Devices

HQ U.S. Army Weapons Command, Rock Island, Ill., has announced establishment of a Test, Measure and Diagnostic Equipment (TMDE) Office.

Created in response to a recommendation of the Brown Board, chaired by General (USA, Ret.) Frederick J. Brown, the TMDE Office will provide a centralized commodity management organization for test and diagnostic equipment. Some projects the office will manage are in existence and others are in planned programs.

One of TMDE's first tasks will be to prepare a register listing of technical characteristics and applications of equipment. Transferred to microfiche cards, the register will be available to design engineers throughout the Army and its contractors. The purpose is to eliminate or minimize duplication of effort.

Other functions of the new office include the monitoring of TMDE with government and industry, and monitoring the Army Materiel Command TMDE interface with major commands.

TMDE responsibilities include items as simple as a tire gauge or as complicated as a sophisticated measuring device with a computer readout. The office functions as the focal point for the entire Army for this type of equipment, used in evaluating the operational condition of a system or determining potential malfunctions.

The objective is to keep combat equipment in a state of readiness.

Brig Gen Kalergis Assigned as AMC Comptroller

Brig Gen James G. Kalergis, I Field Force Artillery commander and chief of staff in Vietnam for the past 18 months, is the new comptroller of the U.S. Army Materiel Command, Washington, D.C.

General Kalergis recently received the Distinguished Service Medal for "exceptionally meritorious service" in Vietnam.

Prior to duty in Vietnam, he was deputy director, Force Planning and Analysis Office for the Army Chief of Staff, and then became executive officer to the Assistant Vice Chief of Staff, U.S. Army.

A 1938 graduate of Boston University, General Kalergis has a master's degree in international affairs from George Washington University (1961) and has completed the advanced management program at Harvard Business School (1966). He is a graduate of the Army War College.

Key assignments have included artillery assignments in Korea and Germany; artillery commander, 2d Armored Division, Fort Hood, Tex.; faculty member, Army War College, Carlisle Barracks, Pa.; G–4, 1st Cavalry Division, Eighth U.S. Army, Korea; assistant secretary of the General Staff, Office of the Chief of Staff.



Brig Gen James G. Kalergis

MICOM CG Advancing to 3-Star Rank in USAREUR

Army Missile Command CG (Maj Gen) Charles W. Eifler has been nominated by President Richard M. Nixon for promotion to 3-star rank, upon reassignment as deputy to the Commander-in-Chief, U.S. Army Europe and Seventh Army. The appointment is subject to Senate confirmation.

Neither the date of assumption of his new command nor the name of his successor to head MICOM had been announced by HQ Department of the Army when the *Army Research and Development Newsmagazine* went to press.

General Eifler has been MICOM CG for two years, since serving 18 months in Vietnam, and is the second officer in 28 years to be selected for promotion to lieutenant general while assigned to Redstone.

As deputy to General James H. Polk, CG of the U.S. Army Europe and the Seventh Army, General Eifler will be concerned with a combat-ready strike force of 130,000 soldiers. They are concentrated to protect the southern region of the Federal Republic of Germany as part of NATO forces defending Western Europe.

General Eifler's military career includes 21 years of experience in the Army missile program in positions of increasing responsibility. Missiles constitute much of the massive firepower of the Seventh Army, including the 400-mile-range Pershing, the Sergeant, Nike Hercules and the Hawk.

Development, production and support of all four missile systems were under General Eifler's direction at Redstone, where he has served three tours of duty. He was commandant of the U.S. Army Ordnance Guided Missile School from 1959 to 1961, then commanded Frankford Arsenal two years, and returned to the Missile Command as deputy CG, Land Combat Systems, until leaving in 1966 for Vietnam. There he received the Distinguished Service Medal for "extraordinary professional competence" as CO of the 1st Logical Command.



Maj Gen Charles W. Eifler

Born Dec. 1, 1914, in Altoona, Pa., he graduated from Pennsylvania State College with a degree in civil engineering in 1936, received a master's degree in electrical engineering from Massachusetts Institute of Technology in 1948, and later attended the Industrial College of the Armed Forces.

McMillan Heads Army Metrology, Calibration Center

Director of the U.S. Army Metrology and Calibration Center, Redstone (Ala.) Arsenal, is the title assumed recently by Col William C. McMillan upon his return from a tour of duty in Vietnam.

Col McMillan served as assistant chief of staff, Maintenance, HQ 1st Logistics Command, U.S. Military Assistance Command, earning the Legion of Merit for his exceptional performance.



Col William C. McMillan

Prior to World War II service in Europe, he attended the University of Illinois and East Illinois State. Upon his return from Europe, he enrolled in the Missouri School of Mines and received a bachelor's degree. He earned an MS degree in mechanical engineering from Purdue University in 1952.

Col McMillan has served tours of duty in Korea and Japan, with the U.S. Atomic Energy Commission in Washington, D.C., with the special weapons division at Sandia Base, N. Mex., with missiles at Fort Bliss, Tex., and at White Sands (N. Mex.) Missile Range, and in the laboratory at Rock Island (Ill.) Arsenal.

MICOM Assigns Col Hazzard as Pershing PM

Assignment of Col Rutledge P. Hazzard as Pershing project manager was announced in July by the U.S. Army Missile Command, where he succeeds Col Edwin A. Rudd, reassigned to Vietnam.

Col Hazzard recently returned from Vietnam as commanding officer of the 52d Artillery Group at Pleiku. He also has served tours in Korea and Germany and in the U.S. with the Assistant Chief of Staff for Intelligence and the Joint Chiefs of Staff in Washington, D.C. He was a project officer in the Control Office of what then was the Army Ballistic Missile Agency at Redstone Arsenal from 1956 to 1959.



Col Rutledge P. Hazzard

Graduated from the U.S. Military Academy, Col Hazzard later earned a master's degree in mechanical engineering from the University of Southern California and a master's degree in business administration from George Washington University. He is a graduate of the Industrial College of the Armed Forces and has completed a management program for executives at the University of Pittsburgh.



U.S. ARMY MISSILE Command Research and Engineering Director Col Nils M. Bengtson fires the TOW simulation round developed recently by Marvin Corroll, MICOM engineer, who is shown lending a helping hand. The round, which uses expended TOW missiles, duplicates the environment of a live TOW missile and has been tested successfully at Redstone Arsenal. Tests have proven it safer and subsantially less expensive than the TOW XM–70 training set. Carroll is a graduate of Howard University.

CAL/AVLABS Symposium Centers on Short-Hop Flight Problems

Scientific precision exemplified to millions the world over who marveled as they observed TV coverage of flights to the moon, nearly a quarter million miles away, is coping less spectacularly with flight problems of 400 miles or less.

This paradox, involving probems of great concern to military as well as mass transportation officials with an eye to requirements of the imminent future, was apparent during discussions at the Third CAL/AVLABS Symposium on Aerodynamics of Rotary Wing and V/STOL aircraft.

Approximately 150 scientists, engineers and technical specialists gathered in Buffalo N.Y. for a 3-day session. It was the third symposium within six years sponsored by the Cornell Aeronautical Laboratory (CAL) with the U.S. Army Aviation Materiel Laboratories (AVLABS).

AVLABS Commander Col Eduardo M. Soler joined with Waldemar O. Breuhaus director of the CAL Flight Dynamics Division, in welcoming the conferees, including several of the nation's recognized leaders in research on rotary-wing and V/STOL (Vertical/Short Takeoff and Landing) aircraft.

Keynote speaker was Alfred Gessow, assistant director for research, Office of Advanced Research and Technology, National Aeronautics and Space Administration.

In listing 11 specific areas in which additional research is needed to solve critical problems of improving operation and capabilities of rotary-wing and V/STOL aircraft, Gessow deplored what he described as a tendency to rush to get into flight development before completing testing of theory and of flight components.

Banquet speaker A. Scott Crossfield, vice president of flight research and development for Eastern Airlines and a former test pilot who was the first man to travel twice the speed of sound in 1953, discussed experience of the company with STOL operations in the Northeast Corridor.

"The nation's airlines were so enamored by high-speed jets that they overlooked the short-haul market," he said. "We found that in 1968, about 60 percent of all airline passengers in the Northeast Corridor and about 40 percent in the nation were traveling less than 400 miles away."

STOL aircraft operations, he said, could give better service to short-haul passengers, and could immediately relieve the "worsening congestion of the nation's airways and major terminals, such as Logan in Boston, LaGuardia and Kennedy in New York City, and Washington National in Washington, D.C. . . . In 1968, nonproductive flying due solely to air space and airport delays was costing Eastern $1 million weekly."

STOL operations would relieve the congestion by using runway and air space not currently used by conventional aircraft. Crossfield said it takes only four acres for STOL landings and takeoffs compared with 50 acres for the big jets. STOL aircraft also could operate from auxiliary airports set up at current terminals.

Nineteen technical papers were presented on theoretical and experimental studies, covering rotor/propeller/wake structure, viscous effects, wind tunnel testing, rotor noise, and aerodynamic problems associated with such new concepts as advancing blades, stoppable and stowable rotors, and jet flap and circulation control rotors.

Participants in a panel discussion centered on the future of aerodynamic research on rotary-wing and V/STOL planes included Edward S. Carter Jr., Sikorsky Aircraft; Charles W. Ellis, Boeing Co.; Frederic B. Gustafson, NASA; J. M. Harrison, Lockheed Aircraft; Robert L. Lynn, Bell Helicopter Co.; and O. E. Michaelson, Canadair Ltd.



AVLABS Commander Col Eduardo M. Soler joins with Assistant Director for Research Dr. Alfred Gessow (left) in NASA's Office of Advanced Research and Technology and Waldemar O. Breuhaus, director, CAL Flight Dynamics Division, at CAL/AVLABS Symposium on Aerodynamics of Rotary-Wing and V/STOL Aircraft.

Col Muldrow Designated Acting CO of Deseret TC



Brig Gen John G. Appel



Col Robert Muldrow

Director of Plans, Office of the Deputy Chief of Staff for Logistics, HQ DA, recently became Brig Gen John G. Appel's new title, ending a 2½-year tour as commander of Deseret Test Center, Fort Douglas, Utah.

Col Robert Muldrow, deputy commander for the past year, was designated acting commander pending selection of General Appel's successor. While attending the United States Military Academy, Col Muldrow was in the only West Point class (1943) in which selected students became rated pilots before graduation. He earned his wings at Ellington Field, Tex.

In 1944–45 he was a bomber pilot with the 9th U.S. Air Force, European Theater of Operations, and then served three years in the Office of the Chief of Staff for Intelligence, HQ U.S. Army Air Corps.

Following a 3-year tour of duty as manpower coordinator, Defense Agencies, Office of the Assistant Secretary of Defense (Manpower), he was assigned in 1966 as vice commander, Air Force Missile Development Center, Holloman Air Force Base, N. Mex., until reassigned to Deseret TC.

Col Muldrow received an MS degree in business administration from the University of Colorado in 1950, completed the Armed Forces Staff College course in 1957, and was graduated from the Industrial College of the Armed Forces Staff College in 1957.

APG Demonstrates Microflash Photography Concept

Soundness of a theory that in-flight projectiles could be photographed with a still camera in broad daylight, so that behavior data can be made readily available, was demonstrated recently at the Army's Aberdeen (Md.) Proving Ground.

A newly developed laser-microflash system has reduced data acquisition time on ammunition acceptance testing to a fraction. The concept was originated and developed by two civilian employes with the Ballistics Measurements Section, Materiel Test Directorate (MTD).

Coinnovators of the electro-optical system, considered a major advancement in microflash photography, are Stanley M. Keen, an instrumentation technician, and Archie B. Kaper, the section chief. A pulse laser produces a short-duration, high-intensity light for use with a Polaroid Land camera for instrumentation photographing of projectiles in flight.

The "Q" switched laser with a 2-joule output is equipped with a negative lens to diverge the laser beam 7 degrees to illuminate a 3-foot diameter circle at a distance of 40 feet.

Electronic sensors, placed along the trajectory (flight course), detect the projectile. Electronic sequencers serve to open a capping shutter and the laser is fired, emitting a light pulse of 20 nanoseconds (0.00000002 seconds) duration to illuminate and effectively "stop" motion of the in-flight missile.

The Ballistic Measurements Section provides photo-instrumentation data on projectile behavior for the MTD mission task of ammunition acceptance testing.

Kaper said infrared film is used to capture the image of projectiles capable of traveling a mile a second (3,600 mph). "We look for such things as launch damage, sabot action, pitch, yaw and security of parts."

Throughout the testing it is important to be able to analyze data as soon as possible. Ideally, this would be immediately after firing and before the next round is fired.

"Under these circumstances," Kaper said, "photographic-film processing time becomes critical."

The new method eliminates the film processing gap as well as dependence on what the section fondly calls "the doghouse," an enclosure necessary for daylight microflash photography.

The doghouse is an 8 x 8 foot wooden structure, designed by Keen 15 years ago, involving a hauling and rigging operation to erect. A light source and camera operate simultaneously to photograph the round as it passes between the sides of the doghouse.



INNOVATOR Stanley M. Keen adjusts microflash system he helped develop to stop photographically an in-flight projectile's image in daylight.

Development of the new laser microflash system was sponsored by the Test and Evaluation Command, headquartered at APG, a major element of the Army Materiel Command, Washington, D.C.

Services Complete 'Cloud Puff' Research at WSMR

Project "Cloud Puff," a large-scale research program to study cloud growth and rain formation over White Sands Missile Range, was concluded recently under joint sponsorship of the Army, Navy and Air Force.

The purpose was to determine how clouds are affected when certain chemicals are projected into the cloud structure.

White Sands Missile Range was selected for the complex studies because of the vast amount of electronic data-gathering facilities available and the occurrence of specific types of cloud build-ups during the summer.

Research required the use of extensive instrumentation installed aboard seven aircraft, extensive photographic documentation, data recording, timing and communications facilities.

The aircraft were used to probe into the clouds at many levels to ascertain the physical conditions under which precipitation is created. The joint effort by the three military services permitted the use of highly sophisticated electronic research equipment.

Project managers are Walter Nordguist, WSMR Atmospheric Sciences Laboratory, Army; Dr. Richard Clark, Earth and Planetary Sciences Division, Naval Weapons Center, China Lake, Calif., Navy; and Dr. Robert Cunningham, U.S. Air Force Cambridge Research Laboratories, Bedford, Mass.

Dr. Ray Booker of Weather Science, Inc., Norman, Okla., is also associated with the project.

Army Merges Offices to Form ADCAT Office at Redstone

Merging of the Air Defense Control and Coordination Systems Product Office with the Target Missiles Product, Office, Redstone (Ala.) Arsenal, has been approved provisionally by the Army Missile Command.



Lt Col Robert P. Loshbough

General F. J. Chesarek, CG, directed the analysis of project and product-managed organizations throughout the U.S. Army Materiel Command which resulted in the merger.

Called the Air Defense Control and Targets (ADCAT) Office, (Provisional), the new organization is headed by Lt Col Robert P. Loshbough, a former instructor at the Project Manager School, Wright-Patterson Air Force Base, Ohio.

Lt Col William L. Rehm, who was target missiles product officer, has been assigned as Redeye missile project manager. Lt Col Steven Dorchak, Jr., who was acting manager of the Air Defense Control and Coordination Systems Product Office, has been reassigned to Fort Benning, Ga.

Col J. R. M. Covert, former Redeye project manager, became program manager when Col J. G. Redmon retired from military duty July 31.

Seminar Dwells on Exploratory Development

Improved management of exploratory development efforts to offset budgetary cutbacks, coupled to inflation of costs, and creative thinking to reduce lead time in materiel development were stressed at a 5-day Army Materiel Command-sponsored seminar at Airlie House, Warrenton, Va.

About 70 top administrators and key scientists from the Army Combat Developments Command, Assistant Chief of Staff for Force Development, Office of the Chief of Research and Development, and other agencies joined with the Materiel Command in considering problem areas.

Maj Gen R. H. Free, AMC Director of Research, Development and Engineering, gave a major address on the twin themes of getting more out of the exploratory development dollar and management to reduce materiel lead time—that is the time from concept to delivery of materiel to armies in the field.

AMC Deputy Director of RD&E (Plans) Dr. J. V. R. Kaufman, the opening speaker, also discussed the lead time and exploratory development problems. Of primary importance, he said, is improved communication between AMC as a developing agency for materiel and users of materiel as represented by the Combat Developments Command.

CDC Deputy CG Maj Gen L. H. Schweiter expressed the opinion that the Army Materiel Command-Combat Developments Command relationship in development of new materiel is a "fine example of close cooperation." He also spoke strongly in support of objectives of the seminar. The seminar chairman Carleton L. Thulin, AMC Science and Technology Division, divided the seminar into six panel groups for general discussion following several presentations that offered an "Overview of Army—1985."

Analysis of the panel reports is expected to extend over a period of several weeks. Among the suggestions and areas for improvement considered valid as this edition of the *Army Research and Development Newsmagazine* was sent to the printer are:

- Formulation of an Ad Hoc AMC-CDC Working Group, at a very early stage, in the drafting of a Qualitative Materiel Development Objective (QMDO). Consisting of technically cognizant personnel, the group would perform continuous bench-level liaison to minimize the need of revisions to the QMDO before approval by HQ DA.
- Increased awareness of future combat troops' requirements and technological opportunities by AMC and CDC to strengthen materially the bond between science and technology personnel and combat developers.
- More rapid coupling of technological advances to Army operational objectives by the production of films describing the fields of expertise of the AMC activities available to CDC personnel—to achieve a better "feel" for existing capabilities.

7 MICOM Employes Gain Cash for Patent Awards

Checks for work leading to patent awards were presented recently to seven Army Missile Command inventors, all employed by the Research and Engineering Directorate, Redstone (Ala.) Arsenal.

J. G. Dunaway was recognized for an invention called a rocket nozzle power converter, which includes a force-transmitting member having a pair of pistons, each mounted in a cylinder and exposed to the atmosphere at the bottom of the cylinders.

Loren L. Dickerson and Raymond A. Brandt (deceased) were recognized for their frequency doubler for periodic electromagnetic waves. A flip-flop is incorporated into the device in a novel circuit capable of performing the frequency doubling.

Thomas R. Bowen and David J. Salonimer, Advanced Research Projects Agency Division, were awarded a patent as coinventors of the light beam spreader, which provides uniform illumination in the far field from a collimated light source having a highly nonuniform output beam.

Barry D. Allan's invention is a hyperbolic method for igniting high-energy difluoramino compounds. Allan is employed in the Propulsion Lab. His method achieves hyperbolic ignition by bringing high-energy compounds characterized by the presence of difluoramino groups into contact with a second compound.

A gyro controller was patented by James V. Johnston, Army Inertial Guidance and Control Laboratory and Center. The invention is described as "a missile system having a gyroscope control mechanism for providing the balancing torque required to maintain a spinning missile on its predetermined flight course."

Research 'Copter Sets Unofficial 316 mph Record

Unofficial world record speed for a helicopter of 316 miles an hour was established recently by the UH–1 Research Compound Helicopter, being developed under contract with the Army Aviation Materiel Laboratories.

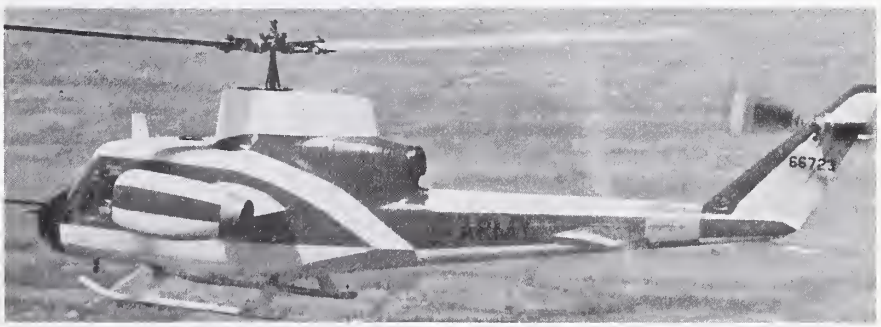
AVLABS Commander Col Eduardo M. Soler announced that the record speed was accomplished during a flight test program at Textron Bell Helicopter Co. at its Fort Worth, Tex., facility. The test was to investigate rotor characteristics at high advance ratios, high blade Mach numbers and aircraft maneuverability.

The AVLABS/Bell research aircraft is a modified YH–40 helicopter using a standard UH–1D teetering rotor hub with modified UH–1B rotor blades featuring lower twist and thinner tips than the standard model.

The test aircraft is powered by a Lycoming T53–L–13, with a wing and two Pratt and Whitney JT12–A3 engines for auxiliary thrust.

Measured vibration within the aircraft cabin was within acceptable comfort limits. The pilot described the ride as comparable to that in a UH–1D helicopter at 135 miles an hour. The flight was made at an advance ratio of 0.726. In earlier tests, an advanceing blade Mach number greater than one was achieved.

Bell's senior experimental test pilot, Lou Hartwig, was at the controls with Bill Quinlan, chief experimental test pilot, as copilot.



UH–1 Research Compound Helicopter

OTSG Announces Top Army Medical Command Assignments



Col Irvin C. Plough



Brig Gen George J. Hayes



Maj Gen Glenn J. Collins

Confirmed by the Senate for promotion to 3-star rank when he takes over from retiring Army Surgeon General Lt Gen Leonard Heaton Oct. 1, Maj Gen Hal B. Jenning Jr. reported recently for interim duty as Deputy Surgeon General, relieving Maj Gen Glenn J. Collins.

Announcement of General Jennings' scheduled rise from colonel to 3-star rank over a period of 13 months was carried in the June-July special consolidated edition of the *Army Research and Development Newsmagazine*, complete with his biographical information and picture.

GENERAL COLLINS, who had served since September 1968 as Deputy Surgeon General, became commanding general of Walter Reed Army Medical Center (WRAMC) when Maj Gen Philip Mallory retired from that office to terminate 25 years of military service.

General Collins served as chief surgeon, U.S. Army Vietnam prior to reporting for duty as Deputy Surgeon General. Prior to that, he was commandant of the Medical Field Service School at Brooke Army Medical Center, Fort Sam Houston, Tex., where he interned in 1935–36.

Graduated from the University of Oklahoma with BS and MS degrees in medicine (1933–35), he served two years at Oklahoma University Hospital prior to entering private practice at McAlester (Okla.) Clinic.

Commissioned in the U.S. Army Medical Service in 1939, he served in the Philippines and in Germany until 1948. His next assignment was at Brooke General Hospital for residency training in general surgery. He added to his professional qualifications with a master's degree in hospital administration from Baylor University in 1960.

General Collins was assigned to the Office of The Surgeon General from 1951 until he was transferred to Ger-

Surgeon General Heaton Ending 43-Year Army Career

Forty-three years of service guaranteeing him historical eminence among the great leaders of the U.S. Army Medical Service will end Oct. 1 for Surgeon General (Lt Gen) Leonard D. Heaton, whose term of office was extended by three presidents to total 10 years.

Appointed by the late General (President) Dwight D. Eisenhower in June 1959, General Heaton remained in office by decisions of Presidents John F. Kennedy, Lyndon B. Johnson (who twice extended his tenure) and Richard M. Nixon.

International renown came to General Heaton as the friend and physician of many of the nation's notables, including General Douglas MacArthur, General George C. Marshall, Secretary of State John Foster Dulles, members of the President's Cabinet, members of Congress, and many dignitaries of other nations.

In the hearts of millions of military men, however, he will be esteemed as the U.S. Army Surgeon General who instituted a vast program of modernization of hospitals advancing training of medical personnel, providing the finest medical equipment available, and extending greatly improved methodology and treatment facilities to soldiers in the field.

A Diplomate of the American Board of Surgery, General Heaton has been recognized for his exceptional services to the medical profession as the recipient of numerous high honors. Included are the Distinguished Service Medal with two Oak Leaf Clusters, doctor of science degrees from Denison University and the University of Louisville, and an honorary degree of doctor of humane letters from Brandeis University.

The American Surgical Association elected him a first vice president, making him the first military leader to gain this distinction.



Lt Gen Leonard D. Heaton

England's RCS Honors Heaton For Surgeon General Services

Honorary Fellowship in the Royal College of Surgeons, one of England's oldest and most prestigious surgical societies, was bestowed recently on U.S. Army Surgeon General (Lt Gen) Leonard D. Heaton in London.

Sir Hedley Atkins, RCS president, praised General Heaton for his contributions to the care and treatment of civilian and military casualties of the Vietnam War as well as for the late General Eisenhower. Lt Gen Sir Norman Talbot, director general, Royal Army Medical Services presided at the presentation ceremony.

many in 1955 as chief, Operations Branch, Medical Division, HQ U.S. Army Europe. Assigned to the U.S. Army Hospital Center, Germany, in 1957, he subsequently was deputy commander and chief, Plans and Operations, until 1958.

In 1959 he began a 2–year tour at Fort Leonard Wood, Miss., as post surgeon and hospital commander. Then he was assigned to Brooke Army Medical Center as assistant commandant, Medical Field Service School.

Maj Gen Joe M. Blumberg's retirement as CG of the U.S. Army Medical R&D Command set the stage for Col Irvin C. Plough to succeed him. Col Plough had served since 1963 as chief of the Medical Research Division and has been deputy commander since October 1967.

Col Plough earned a BA degree in zoology from Amherst College in 1942, MD degree from Columbia University in 1945, and an MS degree in biochemistry from Vanderbilt University in 1956. A Phi Beta Kappa, he taught at Columbia and Vanderbilt while completing degree requirements.

He was CO and director of the Tropical Research Medical Laboratory at Fort Brooke, Puerto Rico (1961–63), CO of the U.S. Army Medical Research and Nutrition Laboratory, Denver, Colo. (1959–60), and chief, Department of Metabolism, Walter Reed Army Institute of Research (1953–55).

Col Plough is a Diplomate of the American Board of Internal Medicine and a Fellow of the American College of Physicians. He has been awarded the Army Commendation Medal and the "A" Prefix for exceptionally outstanding professional work. He is the author of more than 40 papers on diseases of the liver, metabolism and nutrition.

BRIG GEN GEORGE J. HAYES reported recently as director of staff, Office of the Deputy Assistant Secretary of Defense (Health and Medical). He succeeded Maj Gen designee James A. Wier, who has assumed command of Fitzsimons General Hospital, Denver, Colo.

Col Edward H. Vogel Jr., chief of the Consultant Division, and chief surgical consultant, Office of The Surgeon General, was assigned to succeed General Hayes as CG of the U.S. Army Medical Command, Japan.

General Hayes earlier was director, Professional Services, Office of The Surgeon General, for two years. Since 1956 he has served continuously as a consultant in neurosurgery to The Surgeon General, HQ DA.

General Hayes also is an associate professor in neurological surgery at George Washington University School of Medicine, a neurosurgery consultant to the Veterans Administration Hospital in Washington, and an honorary professor in surgery to the Soo Do Medical College, in Seoul, Korea.

After graduating from Catholic University in Washington, D.C., in 1940, he studied at Johns Hopkins University Medical School, Baltimore, Md., and received an MD degree in 1943. He remained there to serve his internship and took residency training in neurosurgery at the Lahey Clinic in Boston and at Duke University Hospital, Durham, N.C.

Commissioned in the U.S. Army Medical Corps in 1946, he was assigned to William Beaumont General Hospital in El Paso, Tex., for a year until appointed chief, Neurosurgery Service, Walter Reed General Hospital (WRGH), Washington, D.C. Subsequently he served as CO of the 46th Surgical Hospital in Korea (1952–53), as chief of Neurosurgery Service at Brooke General Hospital, and another tour at WRGH as chief, Neurosurgery Service.

Other recent key personnel changes in the Office of The Surgeon General include:

BRIG GEN O. ELLIOTT URSIN (designated for 2–star rank), CG of the Medical Field Service School at Brooke Army Medical Center, to become CG of the Center this fall when Maj Gen Laurence A. Potter retires.

BRIG GEN S. H. NEEL JR., surgeon, U.S. Army Element, Military Assistance Command, Vietnam, to command the Medical Field Service School.

BRIG GEN FREDERIC J. HUGHES JR. (designated for 2– star rank), commanding general of WRGH, to succeed Maj Gen Charles H. Gingles as CG, Letterman General Hospital, San Francisco, upon retirement.

COL JOHN B. COATES JR. (Brig Gen designee), CO, Valley Forge General Hospital, Phoenixville, Pa., assigned as CG of Madigan General Hospital, Tacoma, Wash.

COL DAVID E. THOMAS (Brig Gen designee), CO, Womick Army Hospital and surgeon, Fort Bragg, N.C., assigned to HQ U.S. Army, Vietnam.

COL THOMAS J. WHELAN JR. (Brig Gen designee), chief of surgery at the U.S. Army Tripler General Hospital in Hawaii, assigned to a newly created position as a special assistant to The Army Surgeon General on Medical Corps affairs.

Heaton Views Medical Advances on Anniversary

Noteworthy achievements and activities of the U.S. Army Medical Department during the past year were reviewed on its 194th anniversary July 27, with particular praise for results of the 30-day evacuation policy for those wounded in Vietnam.

Army Surgeon General (Lt Gen) Leonard D. Heaton, in a recent speech, commented, "If we were to select the most significant *single* advance of long-range significance in the practice of military medicine, I would have to turn to patient evacuation and its impact on patient care. The full potential of the helicopter in the provision of modern medical care is still to be explored."

One of the year's most important advances in medical care was the bringing of many ancillary medical services directly to the soldier in the field. In September 1968, the first optometry officers were assigned to the divisions serving in Vietnam.

At year's end, optometry sections with two officers and two enlisted optical laboratory specialists were providing vision-care service, including the fabrication of single-vision lenses for spectacles. The saving of "foxhole strength" realized since the start of this program has been of sufficient magnitude to be important to combat unit commanders.

The Military Blood Program Agency, a tri-service program administered by the Army Surgeon General, coordinates the collection, processing and delivery of blood to the overseas areas. To date over 625,000 units of blood have gone to Vietnam. This is approaching double the amount used during the Korean War.

Five mobile dental clinics in shop vans, some air-transportable and some road-transportable, enable a dental officer and enlisted technician assigned to each to travel to isolated areas, perform necessary dental treatment, and supervise fluoride self-treatment. Personnel are screened for possible dental emergencies, thus reducing the manhours lost by soldiers having to return to base areas for dental treatment. Two more mobile clinics are being developed.

A stannous fluoride, self-treatment Preventive Dentistry Paste was introduced in Vietnam last August. The paste is designed for use when time and circumstances will not permit the individual to receive preventive dentistry treatment at the dental clinic.

One dental officer and his assistant

(Continued on page 20)

Heaton Views Medical Advances on Anniversary

(Continued from page 19)

can supervise a group of 50 to 80 men while they apply the treatment paste. An approximate 40 percent reduction of new cavities and an 80 percent reduction in the growth rate of existing dental decay are expected.

Preventable disease is still a prime cause of hospitalization in Vietnam. Medical Service Corps officers with special training in sanitation are now assigned to the seven combat divisions in Vietnam to supervise the field sanitation teams forming a part of each company-sized unit. One sanitation officer participated in several patrols to gain experience on how to improve individual hygiene so methods might be more acceptable to combat soldiers.

Malaria is still a major problem in Vietnam despite continued progress in control measures. Discovery of drug-resistant malaria parasites, however, almost keeps pace with the development of new antimalarial drugs. Steps have been taken to provide all patients evacuated from Vietnam and other malarious regions with compete chemoprophylaxis while under medical care.

A year ago skin diseases were so prevalent in the 9th Infantry Division in Vietnam that 40 percent of a battalion's strength was incapacitated. The daily use of grisofulvin tablets has reduced the incidence of fungus skin disease from 36 to 6 percent of the men at risk.

Recognition and definition of "tropical ulcers" as combined streptococcal and staphylococcal infections have altered the mode of therapy and reduced the average time lost from 11 days to about 5 for such patients.

Of the 12 Reserve medical units called to active duty in the past year, 11 are on duty in Vietnam.

Research and Development. An apparent advance in control of meningococcal meningitis has occurred as a result of extensive research undertaken by scientists of the Army's Medical Research and Development Command. Research over the past six years has resulted in the development of two vaccines that may prevent the disease.

In recent years 200 to 250 recruits have acquired the disease and 2,500 to 3,000 cases occur annually in the civilian population.

The vaccines have now been given to some 16,000 volunteer soldiers at a number of training camps, with encouraging results. Consisting of polysaccharide antigens extracted from meningococcal organisms and purified, the vaccines are prepared so that they conform to federal regulations concerning sterility and lack of toxicity.

Studies were continued on the effects of trauma and its optimal treatment to improve the care of wounded soldiers. An electrical anesthesia device, capable of achieving a surgical level of anesthesia within three minutes and permitting recovery within two minutes of termination, has been evaluated in monkeys. The device will be examined in humans once the safety has been established in primates.

Studies of the effect of heat rash on the ability of the body to perform effectively in hot environments, while the sweat glands are nonfunctional, have shown that heat illness can occur up to four weeks after the clinical healing of a heat rash. It may thus be possible to predict those soldiers whose return to full duty should be delayed lest they become heat-prostration casualties.

A team of medical research specialists and physical scientists has been established to perform intensive studies on biomedical effects of laser devices and systems to develop criteria essential to safe employment.

The clinical use of sulfamylon continued to confirm the findings of earlier investigative work, proving its effectiveness in the treatment of burns and demonstrating that it is responsible for the progressive decrease in major burn mortality.

Silicone rubber can now be used temporarily to restore maxillofacial soft-tissue evulsive wounds. A new material and technique allow molding of a splint for mandibular fracture fixation directly against the mandible. The new intraoral open reduction procedure for mandibular fractures is faster, less traumatic, and reduces hospitalization time.

A major milestone of the Radiation Protection Program was passed when Compound No. 638, the thiophosphate derivative of mercaptoethylamine, was tested for clinical tolerance in humans. This is the first active anti-radiation agent found acceptable for clinical testing in humans in 10 years of searching for such a compound. It was found to be nontoxic when administered orally at the same dose level used in the monkey experiments.

Considerable progress has been made in the past year in the implementation of automated nursing notes and psychological tests.

Among the biomedical engineering projects being developed are an automated scanner for panographic dental X-rays; an automatic fabricator for spectacle lenses; insect and rodent control equipment; lightweight kits and equipment for use by Special Forces; and improved field dental equipment. Future projects will include studies and equipment development in automation of laboratory procedures, clinical data gathering, monitoring of patients and records.

The Medical Unit, Self-contained, Transportable (MUST) hospital and its equipment are under continuing tests to determine optimal layouts, the advantages of various combinations of interconnecting shelters, passageways and employment of utility elements.

In the areas of clinical research, studies at Tripler Army Medical Center in Hawaii suggest that unique metabolic changes occur in patients with white phosphorus burns. Unlike the usual serum electrolyte disturbances seen with thermal burns, serum calcium falls precipitously and may result in sudden unexpected death.

Madigan General Hospital at Tacoma, Wash., was the testing ground for the child-resistant container for dangerous chemicals called the "Palm-N-Turn," which proved to be almost impossible for small children to open. This valuable clinical research program prompted Senator Magnuson of Washington State to initiate legislation to enforce its universal use for products poisonous or potentially harmful to children.

Shock is being studied at the Letterman Army Institute of Research in San Francisco, where a herd of sheep are grazing in the old Coast Artillery bunkers and gun emplacements facing San Francisco Bay and the Golden Gate Bridge. The sheep are being used to study shock, its causes, effects and possible antidotes.

Building Program. The new Letterman General Hospital was dedicated this year, constituting a significant milestone in the continual modernization program of the Army Medical Department. In the past 10 years 21 new hospitals have been opened.

Other new hospitals, dental clinics, laboratories and research facilities are under construction. A building to house the Medical Museum is being added to the Armed Forces Institute of Pathology on the Walter Reed Army Medical Center grounds.

Preventive Medicine. Because of the susceptible age group in military service, the Army has set up an early detection program on tuberculosis case finding, involving tuberculin skin testing before a soldier's departure and after his return from an overseas assignment, or at 3-year intervals, whichever is sooner. Those

with positive skin tests are followed with periodic X-ray.

The Army's new *rubella* (German measles) vaccine program is consistent with the U.S. Public Health Service recommendations to concentrate on the immunization of dependent children.

Influenza immunizations are given annually. Composition of the vaccine varies each year, depending on the strains determined to be prevalent that year.

General Developments. A conceptual design of the Automated Military Outpatient System (AMOS) is in the final stages of preparation. The user will select words and phrases from frames displayed on a video screen in order to record and communicate medical and administrative information through the computer.

The AMOS will cover every facet of information, including the recording, communication, storage and retrieval necessary to the Army Medical Department's outpatient health service system.

More than two million examinees in the past year were processed through the Armed Forces Examining and Entrance Stations. An automated medical examination system is being developed to conserve medical manpower, increase accuracy, improve record storage and retrieval, and provide statistical data at a more economical cost. The prototype system will be ready for testing in two or three years.

A bright red, annodized aluminum Medical Warning Tag, similar in size and contour to the regular identification tag, is now being authorized for those persons known to be allergic to or adversely affected by certain drugs or medications. The tag is worn on the "dog tag" chain.

Three important medico-military historical volumes were published during the past year: *The Army Medical Specialist Corps; Medical Supply in World War II;* and *Internal Medicine in World War II.*

DENTAL CORPS. A new Panorex machine permits the taking of a complete picture of all teeth with one exposure while the Army recruit is in basic training. The film reveals defects and enables the dental officer to plan care on a priority basis.

A Dental Combat Effectiveness Program has been established at selected training centers where special attention is given to the men in those combat units who are likely to serve in Vietnam. Men with oral conditions that have a high probability of causing acute pain or infection within the next year are screened out and treated during periods designated by training officers as being least disruptive to their training.

VETERINARY CORPS. VC officers are deeply involved in research, investigating the nutritional requirements of military dogs, advising on training them to detect marijuana and other narcotics, and conducting a Biological Sensor Program at Edgewood Arsenal to identify and develop an improved dog through scientifically selected breeding and research in animal behavior.

MEDICAL SERVICE CORPS. The 20th career field within the MSC was created by the establishment of a new specialty, the Military Community Oral Health Manager. Recruitment is underway for officers qualified to plan, manage, conduct and evaluate military community oral health programs, and to plan, train, and evaluate the technical performance of dental hygienists.

Increased participation in a variety of educational programs has helped Medical Service Corps officers raise their educational level; nearly 3 percent have PhDs, over 21 percent have master's degrees, and more than 92 percent have bachelor's degrees. MSC officers are encouraged to attend military courses in their specialties.

Col Billy C. Greene, MSC, optometry consultant to The Surgeon General, received a suggestion award during the past year for a plastic covering for dog tags which has the soldier's eyeglass prescription imprinted on it. The item was tested in Alaska and Panama and found so satisfactory that the Army ordered four million covers.

ARMY NURSE CORPS. A new ANC white hospital duty uniform is being tested at Walter Reed Army Medical Center. Designed at the U.S. Army Natick Laboratories, it is made of an easy-care fabric in an "A" line style which flatters most women. Sometime this fall the wearers will be asked to comment on the design, fit, comfort, washability, durability, and suitability of the test uniforms.

The course in Operating Room Nursing was shortened from 22 to 16 weeks and the number of courses increased from four to eight per year.

Obligated service for such clinical nursing courses as those in the fields of neuropsychiatry, maternal-child health, operating room nursing, medical-surgical nursing, and Army Health Nursing were discontinued during the year in an effort to encourage more nurses to take advantage of this in-service training.

Out of over 800 applicants, 170 were selected to enter the college of their choice this fall under the Walter Reed Army Institute of Nursing Program. The second class of graduates of the program received BS degrees in nursing from the University of Maryland this June.

MEDICAL SPECIALIST CORPS. An optional dietetic internship program leading to a master of science degree was established at Walter Reed General Hospital in FY 1969. Dietetic interns receive credits for some of the courses taught as part of the program, and may earn the remainder of their credits at the University of Maryland.

Programed texts have been developed for instructing patients on modified diets. The texts are aimed at not only explaining the diet requirements, but also giving the patient an understanding of why the diet was prescribed.

ENLISTED PERSONNEL. The State of California accredited the Clinical Specialist School at Letterman General Hospital in February, making it possible for graduates to take the licensed vocational nurse examination immediately on completion of the course. This accreditation should prove a tremendous benefit to clinical specialists making the transition to civilian life in California.

Several new courses have been inaugurated during the year for enlisted personnel of the Medical Department. Among these are dental administration; blood grouping, collection and processing; dialysis; and hospital mess stewardship.

MSC Draws 100 Officers From OCS at Fort Benning

U.S. Army Medical Service Corps recruitment, for the first time in more than three years, will draw about 100 new officers from the officer candidate school (OCS) at Fort Benning, Ga., in Fiscal Year 1970. Additions in recent years have been either Reserve Officer Training Corps graduates or recipients of direct commissions.

Near the conclusion of OCS, candidates who have indicated their preference for the Medical Service Corps will be considered for selection. If chosen, they will attend a 4-week course at the Medical Field Service School, Ft. Sam Houston, Tex.

Some 6,000 Medical Service Corps officers are serving throughout the world in one of 19 different areas of specialization allied to medicine or medical administration, including aeromedical evacuation. Ninety-two percent of the Medical Service Corps officers have a baccalaureate degree-23 percent have a master's degree and about three percent have doctorates.

Computer System Pioneer Retires From Military Service

Col Earl I. Seekins, special assistant to the commanding general, U.S. Army Computer Systems Command, and a pioneer in automating Department of Defense Supply operations, retired Aug. 1 from military service.

In the early 1950s when solutions to the computer input/output problems began to appear, he ordered the first computer for Army supply operations. Assignments during 17 years involved him in development of new computer concepts of far-reaching impact.

By 1954, Col Seekins became convinced, and convinced his boss, Maj Gen Kester Hastings, then Quartermaster General of the Army, that one computerized national inventory control agency could perform better and at less cost than the seven regional stock control agencies then performing these functions.

This suggestion, radical at the time, met considerable opposition. Today, centralized computerizel national inventory control is an accepted way of life, both in government and industry.

In 1956, the Army gave Col Seekins an opportunity to test centralized computerized inventory control for military supply overseas. The Seventh U.S. Army in Europe was selected as the test area. Repair parts, the Achilles heel" of Army supply, were the items to be subjected to the test.

The experiment was titled Project MASS (Modern Army Supply System) and its success led to more innovations. Two of the more important were the consolidated control of all Technical Services items and the use of electrical communications for transmission of all supply data within Europe and to and from the United States. Many concepts proved by this test are standard practices today.

In 1962, upon creation of the Defense Supply Agency with Lt Gen Andrew T. McNamara as its first director, Col Seekins became the first director of Data Systems. Data systems first again emerged; the "one system" concept is an example. Eighty computers of various makes and models were replaced, through competitive selection, with program compatible computers.



Col Earl I. Seekins

Standard applications were then centrally designed, programed, maintained and controlled. This approach is common today. Standard software packages for business type operations such as banking is becoming a major business.

In 1966, when the Army needed to install a very large computerized inventory control center in Okinawa to support Vietnam military operations, Col Seekins was sent as director of Data Systems. Here, he established, as he had in Europe in 1956, the first ADP/Inventory Control School and trained local non-English speaking (as well as American) personnel to program and run the system.

Soldier's Invention Speeds Innoculation of Lab Mice

Award of a patent for a novel device to hold laboratory mice for inoculation was made recently to Army Sp/7 Daniel Berkowitz, a microbiologist at the U.S. Army Natick (Mass.) Laboratories.

Designated officially as a "Restrainer for Long-Tailed Animals (U.S. Patent No. 3,442,255)," the invention consists of a tapered open-end enclosure into which the tail is inserted through a slot and held securely by a padded clamp. Another opening provides access for inoculating the animal's abdominal region.

The restraint is expected to reduce the incidence of animal bites to laboratory workers and accidental self-injection. It also increases the speed at which animals can be handled from about 300 a day to as many as 250 an hour. Training of laboratory assistants, especially timid women, who dislike handling mice, is made faster and easier.

Specialist Berkowitz, a native of New York City, has a degree in hotel technology from New York City Community College and in 1962 received a BS in food technology from Iowa State University, where he studied under a 2-year Army scholarship.

Before his assignment to Natick in 1964, he served at the Food and Container Institute for the Armed Forces, at Chicago, and in Puerto Rico. In May 1966, he assisted in conducting a field test in Vietnam of a new, experimental 25-man ration system. He is a member of the Research Society of America.



Sp/7 Daniel Berkowitz

Edgewood Technical Director Returns to University Post

Edgewood Arsenal's top scientist, Technical Director Dr. Charles A. Reynolds, resigned effective Aug. 15 to return to his professorship in chemistry at the University of Kansas. Dr. Reynolds was granted a leave of absence in August 1967 to accept the arsenal appointment.



Dr. Charles A. Reynolds

Working directly with the commanding officer, he was responsible for the direction and effectiveness of the technical aspects of the research, development, engineering, quality assurance, manufacturing, mobilization planning, and procurement program of the installation.

Dr. Reynolds also worked with the commanding officer to review the arsenal programs to determine actions to meet military requirements.

Dr. Reynolds had previously been associated with the arsenal in 1951 in the Operations Research Group, a period that he also served as technical adviser to the Chief Chemical Officer and weapons Systems Evaluation Group consultant, Office, Joint Chiefs of Staff, Washington, D.C.

OCRD Announces 6 Staff Assignments

Five officers and a civilian comprise the list of recent new assignments with the Office of the Chief of Research and Development, HQ DA.

Lt Col Donald W. Pulsifer was assigned as chief, Research Programs Office, U.S. Army Research Office (USARO), after rceiving an MBA degree from Harvard Business School. He earned his BA degree from Norwich Unviersity in 1953 and completed the Command and General Staff College (C&GSC) in 1967.

Lt Col Pulsifer served with the 4th Infantry Division, Fort Irwin, Calif. (1965–66), and with the U.S. Army Officer Evaluation Center at Fort McClellan, Ala. (1964–65).

He was an adviser to the 25th Vietnamese Infantry Division, Quang Ngai, Vietnam (1962–63); HQ III Corps, Fort Hood, Tex. (1961–62) and instructor at the U.S. Army Armor School, Fort Knox, Ky. (1960–61). He holds the Army Commendation Medal (ARCOM) with three Oak Leaf Clusters (OLC).

Lt Col Harold K. Chandler completed the Advanced Career Course, U.S. Army Medical Field Service School, Fort Sam Houston, Tex., prior to assignment as a staff officer with the Life Sciences Division, USARO.

He has a doctorate in veterinary medicine from the University of Georgia (1956) and an MS degree in food science and technology from the Massachusetts Institute of Technology.

From 1964 to 1968, he served as a research microbiologist and assistant for food radiation at the U.S. Army Natick (Mass.) Laboratories.

Other assignments include post veterinarian, U.S. Army Medical Command, Japan (1959–62) and assistant post veterinarian, Fort Benning, Ga. (1956–59). He holds the ARCOM with OLC and the National Defense Service Medal.

Lt Col William H. Revell was assigned as a staff officer with the Regional and special Projects Branch, Environmental Sciences Division, USARO, after a year of service with CORDS Engineering/I Corps Tactical Zone, Danang, Vietnam.

He has BS and MS degrees in civil engineering from Clemson University (1953) and Purdue University (1967).

Assignments in recent years have included staff officer and deputy commander, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Va. (1966–68); engineer adviser, MAAG, Ethiopia (1964–65); and resident engineer, Corps of Engineers Ballistic Missile Construction Offices (CEBMCO) at Whiteman Air Force Base (AFB), Mo., and CEBMCO, Malmstrom AFB, Mont. (1961–63).



Lt Col D. W. Pulsifer



Lt Col H. K. Chandler



Lt Col W. H. Revell



Lt Col H. J. Skinker



Lt Col D. R. Willwerth



Robert A. Henry

Lt Col Harry J. Skinker became executive officer for the Advanced Ballistic Missile Defense Agency (ABMDA) after serving as deputy and commanding officer, U.S. Army Maintenance Plant, Schwaebisch Gmuend, Germany, since 1966.

He has a BS degree in agricultural education from Virginia Polytechnic Institute (1953) and an MBA degree from the University of Alabama (1966). Military schooling includes the Air Defense Missile School, Fort Bliss, Tex. (1958) and the Ordnance Officer Career Course (1964).

The colonel served major tours in Korea with the 71st Ordnance Group, Ammunition, (1962–63) and with the Sergeant and Pershing Projects at White Sands (N. Mex.) Missile Range (1959–62).

Lt Col Dean R. Willwerth is an R&D coordinator with the Mid-Range Plans Branch, Plans Division, OCRD, following almost three years as a training staff officer (Aviation), U.S. Continental Army Command.

Lt Col Willwerth served a tour of duty in Vietnam after he completed the C&GSC in 1965. He earned a BS degree in education from the University of Iowa in 1954.

In 1963–64, he was an aerial radar section leader with the 503d Aviation Battalion, 3d armored Division in Germany. He holds the Bronze Star Medal, Air Medal and ARCOM.

Robert A. Henry is employed in the Contracts and Grants Branch, Research Programs Office, USARO, following 10 years as a buyer and purchasing agent with Melpar, Inc.

Henry served 2½ years continuous active duty with the U.S. Marine Corps, including executive and commanding officer with the 2d and 3d Marine Divisions in Saipan and Japan.

He has completed the Radio Intelligence Officers Course and the Communications Officers School, and has served at Quantico (Va.) Marine Base, Fort Schuyler (N.Y.) Naval and Marine Training Center and the National Security Agency, Washington, D.C.

Among his citations are the Asiatic Pacific Campaign Medal, Army-Navy Occupation Service Medal, Korean Service Medal and U. N. Medal.

MICOM Picks Sergeant Missile PM

Lt Col Paul Blackburn has been named Sergeant missile project manager at Redstone Arsenal, Ala.

Col Blackburn thus becomes the first officer to serve as an aide-de-camp at Redstone and, subsequently, to return as project manager of a missile system. He was an aide to Maj Gen John A. Barclay, former deputy commander of the Army Ordnance Missile Command.

Col Blackburn's previous assignment at the arsenal was as deputy chief, Advanced Forward Area Air Defense Systems, in the Future Missile Systems Division, Research and Engineering Directorate.

Major RDT&E, Procurement Contracts Exceed $535 Million

Awards to General Motors Corp. and Colt's, Inc., accounted for a substantial share of Army RDT&E and procurement contracts totaling $535,032,223 from May 29 to July 20.

General Motors received $42,723,344 in nine contracts (including $23,783,556 for M16 rifles) for transmission assemblies for M107 and M551 vehicles, metal parts for 105mm projectiles, breech mechanism assemblies for 152mm gun launchers, diesel engines for M109 vehicles, and for actions relating to the Main Battle Tank.

Colt's, Inc., was awarded $41,158,294 for M16 rifles. A $39,334,623 modification for continued maintenance and scheduled inspections of aircraft was awarded to Page Aircraft Maintenance, Inc.

Five contracts totaling $30,078,901 with Raytheon Co. are for work on the Hawk missile system, for artillery ammunition fuzes and for multiplexers with running spares. Sperry Rand Corp. received a $28,259,984 modification contract to load, assemble and pack ammunition.

Bell Helicopter Co., and Bell Aerospace Corp. gained $25,896,623 (seven contracts) for U–1H, UH–1N, OH–13S helicopters and for wing hubs, gear boxes, transmission assemblies and repair parts for helicopters.

Five contracts with General Electric Co., totaling $18,396,064, are for 135 MW generators; armament subsystem for HueyCobra helicopters and 20mm guns (Vulcan); Chaparral guidance section depot equipment and related documentation; 20mm guns, M61A1s and GAU–4s, and SUU–23/A armament pods; and for mobile HIPAR for the Nike Hercules system.

Eastman Kodak is receiving $12,393,980 (three contracts) for safety devices for fuzes and various types of explosives. Magnavox Co. was issued a $10,995,948 order (three contracts) for AN/GRC radio sets.

Contracts under $10 million. Olin Mathieson Chemical Corp., $9,518,089 (three contracts) for production, loading, assembling and packing propellants; Continental Motors Corp., $9,018,403 for remanufacture of multifuel engine assemblies; and

Hercules, Inc., $8,916,263 (two contracts) for propellants; Norris Industries, Inc., $8,649,907 for 105mm cartridge cases; LTV Electrosystems, Inc., $8,554,746 for components of AN/VRC–12 radio sets; Remington Arms Co., $8,247,711 (two contracts) for loading, assembling and packing small-caliber ammunition; and

Atlas Chemical Industries, Inc., $7,849,972 (two contracts) for TNT; Defense Metal Products Division of Southern Airways Co., $7,597,260 for 155mm projectile parts; Martin Marietta Corp., $7,320,438 for multiplexers and channel cable combiners and containers, and for modification kit installation and training for the Pershing missile system; and

Chamberlain Manufacturing Corp., $7,308,902 (two contracts) for 105mm and 155mm projectile parts; Pullman, Inc., $7,266,490 for semitrailer chassis; Philco-Ford Corp., $7,106,791 (two contracts) for engineering services on the Shillelagh missile system and for work on a telecommunications system on Taiwan and Okinawa;

Mason and Hanger-Silas Mason Co., $6,715,262 (two contracts) to load, assemble and pack bombs and projectiles; Wisconsin Motor Corp., $6,298,912 for military engines; Day and Zimmerman, Inc., $6,148,306 (two contracts) to load, assemble and pack ammunition; and,

E. I. du Pont de Nemours, Inc., $5,978,379 (two contracts) for production and operation of TNT plants; Kisco Co., Inc., $5,937,750 for parts for 105mm cartridge cases; AMTRON, Inc., $5,890,000 for switchboards; Ross Aviation, Inc., $5,410,305 for aircraft training services and

Litton Systems, Inc., $5,321,380 (two contracts) for data-converter-coordinated, air-defense systems, and inertial navigational systems for the Mohawk and U–21 aircraft; Texas Instruments, Inc., $5,258,150 (three contracts) for electronic equipment; Firestone Tire and Rubber Co., $5,115,550 (two contracts) for various ammunition and wheel assemblies for M113 armored personnel carriers.

Contracts under $5 million. Mine Safety Appliances Co., $4,793,071 for protective field masks; Hamilton

Army Schedules SPIW Prototype Tests for 1970

Twenty prototypes of the Army's flechette-firing Special Purpose Individual Weapon (SPIW) are being fabricated for delivery and engineering design tests programed for 1970 at Aberdeen (Md.) Proving Ground and Fort Benning, Ga.

The SPIW is one of the weapons systems being developed under the Army Small Arms Program (ARSAP) to increase the soldier's probability of a hit and provide more firepower for a given combat load.

Under production by AAI Corp., the prototypes are officially designated the "XM19 Rifle, 5.6mm, Primer Activated, Flechette Firing." A selector lever on the side of the weapon makes it possible to fire, fully automatic, a controlled burst of three rounds or a single shot.

When the weapon is fired, the flechette is pulled down the barrel by a plastic sabot which separates and is discarded after exit from the muzzle. Each round of ammunition has a piston-primer that ignites the propellant and provides power for recycling the weapon.

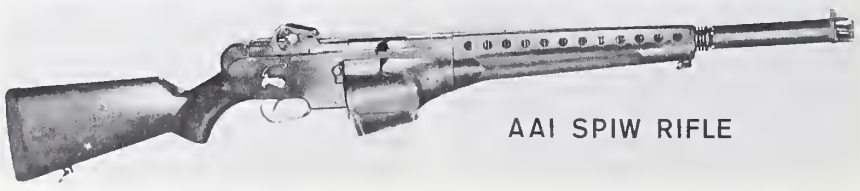
The miniature pistor-primer eliminates the need for a gas system in the weapon which, in turn, simplifies the rifle mechanism and decreases the weight to about seven pounds.

The XM19 is fitted with a 60–round drum magazine, although a box magazine is being considered by designers. The rifle also has the capability of mounting a single–shot grenade launcher which can be fired from the same trigger by further rotation of the selector lever.

Two 40mm launcher attachments are being considered for area-fire capability. These include the XM203 pump launcher, which is being developed as an attachment to the M16A1 rifle, and the Disposable Barrel Cartridge Area Target Ammunition (DBCATA) launcher.

In addition to the XM19, two other design concepts are being considered as possible contenders for the future rifle, in the U.S. Army Small Arms Program. The first is a microcaliber, high-velocity-bullet firing system that may possibly use the Springfield Armory-developed SPIW mechanism. The second is a multiflechette system that launches flechettes simultaneously down the same barrel.

None of these systems is developed to the extent of the XM10, but they offer alternatives with various advantages and disadvantages that will be considered as the development phase continues.



AAI SPIW RIFLE

Watch Co., $4,415,800 (two contracts) for safety devices for fuzes; Honeywell, Inc., $4,234,440 (three contracts) for classified work and for fuzes for bomblets; and

General Dynamics Corp., $4,152,586 (two contracts) for development of an advanced sensor and passive-optical seeker in support of the advanced development phase of the forward area air defense system; and

Curtiss-Wright Corp., $3,837,496 for Mobile Tactical Imagery Interpretation Facilities; Boeing Co., $3,750,-101 (three contracts) for an analysis of the Ballistic Missile Defense Alternative Study and for CH–47C helicopter modification kits, rotor blade modification, shop supplies, and miscellaneous tools; and

Sylvania Electric Products, Inc., $3,575,783 (two contracts) for parts for AN ARC radio sets and AN/ARN–89 direction finder, and for classified work; Henry Spen and Co., Inc., $3,432,657 for 4-ton trailers; Stevens Manufacturing Co., $3,362,817 for semitrailers and water tank trailers; and

Ovitron Corp., $3,355,526 for radio sets and receiver transmitters; IBM Corp., $3,260,717 (two contracts) for a mobile logistics computer system and for a combat service support system; J. I. Case Co., $3,157,961 for scoop loaders; Lear Siegler, Inc., $3,000,000 for classified electronic equipment; and

Kaiser Jeep Corp., $2,924,159 (two contracts) for trucks; Motorola, Inc., $2,848,125 for test equipment and ancillary items, drawings and technical publications for AN/APS–94D radar sets; LTV Aerospace Corp., $2,720,-000 for industrial services for the Lance missile system; and

FMC Corp., $2,717,500 for work on the M113A full-track vehicles; United Aircraft Corp., $2,553,709 for a roller gear transmission system on the S–61 helicopter; Westinghouse Air Brake Co., $2,468,895 for road graders; John Wood Co., $2,460,560 (two contracts) for fin assemblies with crate and suspension lugs for bombs; and

Hughes Tool Co., $2,247,000 for rotary-wing blades for OH–6A aircraft; Henry J. Kaiser Co., $2,158,500 for modernization and engineering analysis of ammunition production plants; Gentex Corp., $2,047,473 for SPH/4 helmets; Bristol Electronics, Inc., New Bedford, Mass., $2,022,282 for AN/PRC–25 radio sets.

Contracts under $2 million. Harvey Aluminum Sales, Inc., $1,963,233 to load, assemble and pack ammunition; Thiokol Chemical Corp., $1,898,190 for 40mm CS cartridges; Lockheed Aircraft Co., $1,847,853 for parts for radar and test sets for the Vulcan system; and

Varo, Inc., $1,780,021 for miniaturized night-vision sights; Gibbs Manufacturing and Research Corp., $1,763,200 for fuzes for 2.75-inch rockets; Grevis B. Webb Co., $1,679,242 for a materials handling system and storage modernization system; and

Collins Radio Co., $1,666,682 for direction-finder sets, radio receivers, controls and mountings; Kentron, Hawaii, Ltd., $1,656,156 to support maintenance and calibration standards of test equipment in the Pacific Theater; and

Midvale-Happenstall Co., $1,618,400 for tube forgings for 175mm guns; Computer Sciences Corp., $1,600,000 for ADP services; Teletype Corp., $1,500,000 for electronic equipment; Amtex Corp., $1,500,000 for classified R&D; and

RCA, $1,464,750 for R&D on Land Combat Support System; Westinghouse Electric Corp., $1,444,000 for balanced pressure systems and ancillary items; Fairchild Space and Defense System, $1,414,270 for proximity fuzes; and

Link Belt Feeder Division of FMC Corp., $1,388,280 for self-propelled pile-driver hammers; National Gypsum Co., $1,366,230 for loading, assembling and packing ammunition; Poloron Products, Inc., $1,362,793 for bomb fin assemblies with crate and suspension lugs; and

KDI Precision Products, Inc., 1,347,300 for fuze parts; Milgo Electronic Corp., $1,313,335 for an instrumentation radar system; Uniroyal, Inc., $1,307,301 for production of TNT and other explosives; and

General Time Corp., $1,292,827 for mechanical time fuzes; Mohawk Rubber Co., $1,285,428 for tires for military trucks; Kaman Nuclear Corp., $1,261,898 for acquisition of part two on EMP study for Safeguard Communications System Test Program; and

Federal Electric Corp., $1,250,000 to engineer, furnish, install and make operational an integrated microwave line-of-sight telecommunications system in the Federal Republic of Germany; and

A. G. Schoonmaker, Inc., $1,236,910 for diesel generator sets; Emerson Electric Co., $1,234,949 for repair parts for the XM28 Armament Subsystem for 7.62 machineguns and 40mm grenade launchers; White Motor Corp., $1,224,221 for 2½-ton trucks; and

Allis Chalmers Manufacturing Co., $1,194,305 for fork-lift trucks; L. E. Mason Co., $1,181,036 for nose body assemblies for incendiary bomb clusters; Electromagnetic Technology Corp., $1,176,750 for parts for radar sets for the Vulcan Air Defense System; and

Davey Compressor Co., $1,096,615 for compressors; Kanarr Corp., $1,096,290 for grenade launchers; PRD Electronics, Inc., $1,094,524 for container assemblies and equipment for metrology calibration of missiles;

Missouri Research Laboratories, $1,083,498 for the Army MUST hospital service ward units; Motorola, Inc., $1,079,655 for R&D feasibility phase for the Terrain Avoidance Radar; Hawthorne Aviation Co., $1,078,417 for aircraft maintenance;

Goodyear Tire and Rubber Co., $1,076,470 for track-shoe assemblies for M108 and M109 howitzers; Massachusetts Institute of Technology, $1,035,500 for computer analysis in Behavioral Sciences; and General Instrument Corp., 1,011,809 for fuzes.

Twister Prototypes Undergo Initial Shakedown Tests

Production of the first of three prototypes of a new kind of 8-wheeled Army combat vehicle being built for the Army Tank-Automotive Command under a $3 million contract awarded in January 1968 was announced July 15.

All of the prototypes will be military test versions of the Twister concept vehicle developed by Lockheed Ground Vehicle Systems, embodying a pivotal yoke that permits two bodies to flex freely for rough terrain travel.

The 18-foot-long 8-ton prototype is larger and heavier than the first Twister demonstrated by Lockheed prior to award of the development contract. Two large V–8 engines provide a high horsepower-to-weight ratio, expected to yield exceptional cross-country performance for combat use.

The suspension system and flexible joint between the two bodies enable the eight driving wheels of the vehicle to maintain ground contact under the most difficult terrain conditions. The design also protects the occupants of the vehicle from severe bumps and jolts.

Shakedown tests of the prototype are scheduled to begin at Lockheed test courses and continue through September and November when the second and third models roll off the production line. The first delivery to the Army Tank-Automotive Command is scheduled in January 1970.

Lockheed officials state that in four years of tests over all types of terrain, including snow and deep mud, the Twister testbed has demonstrated its ability to move rapidly under full control with major performance improvements.

SATCOM Terminals Provide Communications for Apollo 11 Operations

Apollo 11's final earthward descent link with home was a communications satellite parked 22,000 miles above the equator and a handful of small satellite terminals scattered halfway across the globe.

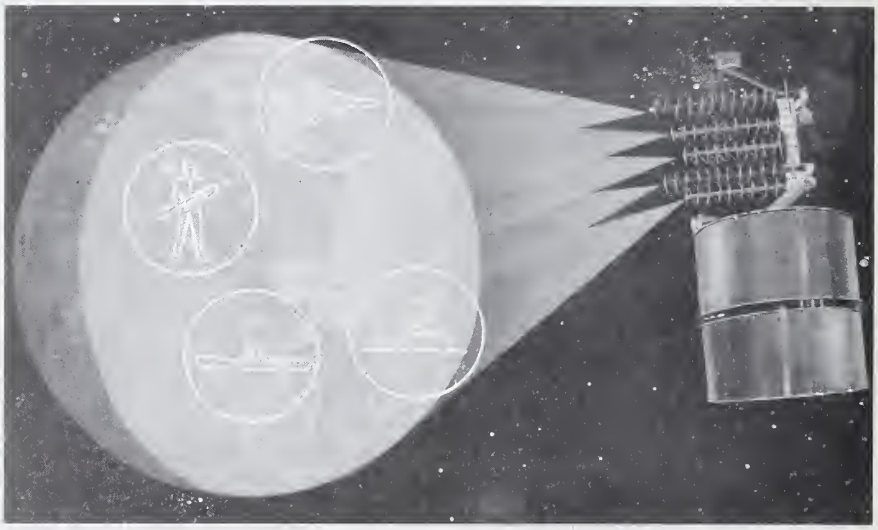
Playing a significant role in this link, called TACSATCOM (Tactical Satellite Communications), was the Army SATCOM Agency at Fort Monmouth, N.J. Army and Air Force developed terminals provided the first line of communications during Apollo 11 recovery operations.

The Army was designated the "lead service" for the joint (Army, Navy, Air Force, Marine Corps) operational tests during the Apollo 11 mission.

Terminals under SATCOM Agency technical control operated at Wheeler Air Force Base in Hawaii. The TACSATCOM Joint Service Test Directorate, HQ SATCOM, provided operational satellite time. The SATCOM Test Operations Center, also at Fort Monmouth, coordinated satellite time. Army TACSATCOM monitoring facilities, called TRICOM 75, at Lakehurst (N.J.) Naval Air Station conducted the power level and technical interface adjustments to insure network quality.

UHF (ultra-high-frequency) terminals were on board the Primary Recovery Ship (PRS), the aircraft carrier *U.S.S. Hornet,* aboard the Apollo Range Instrumentation Aircraft (ARIA), and at Wheeler Air Force Base in Hawaii, at Scott Air Force Base in Illinois and at Alternate Mission Control, Cape Kennedy, Fla.

Full-time TACSATCOM support of Apollo 11 started four days prior to launch with the sailing of the *U.S.S. Hornet* from Pearl Harbor to the scene of recovery operations in the Johnston Island area about 300 miles southwest of Hawaii. During recovery, TACSATCOM provided primary command and control circuits between the PRS and the Army station at Wheeler AFB and then to Mission Control in Houston, Tex.



TACSAT I Used for Apollo 11 Recovery

The Army's Hawaii station included two SATCOM Agency terminals, the team pack and 1¼-ton shelter operated by a military team from SATCOM Field Station No. 1 at Lakehurst, and one Marine Corps team pack. Two Air Force 1 1/4-ton shelter terminals operated at Scott Air Force Base and the Marines had a similar terminal at Cape Kennedy.

The decision to use TACSATCOM for Apollo 11 recovery operations resulted from its convincing demonstration of effectiveness during the Apollo 10 mission provided by TACSATCOM as backup to Apollo 10 high-frequency communications, establishing the user confidence to advance the network to a primary role in Apollo 11.

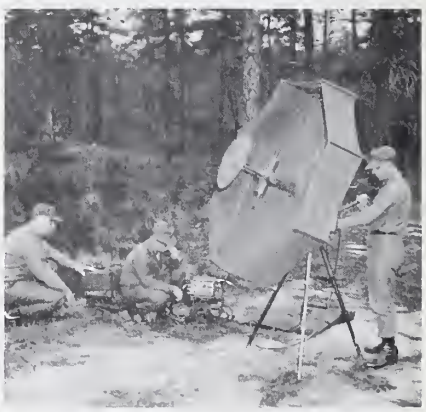
TACSAT I, the experimental synchronous satellite launched from Cape Kennedy aboard a TITAN IIIC Feb. 9, 1969, weighs approximately 1,600 pounds and is over eight feet in diameter. It carries a cluster of antennas capable of radiating signals that can be picked up by all types of ground terminals, and operates in both UHF and SHF frequency bands.

AN/TRC–56. Called the "Team Pack," this ground terminal can be erected in 15 minutes and breaks down into three packages for hand carry or back pack by frontline communications teams. It includes an ultra-high-frequency receiver-transmitter, alert receiver, battery pack and a 5-foot diameter short-back-fire antenna. For the Apollo 11 mission, two Team Packs were located at Wheeler Air Force Base, one operated by a team from the Army SATCOM Agency, Fort Monmouth, N.J., and the other by personnel from the Marine Corps Development Center, Quantico, Va. Both terminals were under SATCOM Agency control.

AN/TRC–157. This ultra-high-frequency ground terminal is installed in a shelter normally transported by a standard 1¼-ton vehicle but can be carried by either helicopter or cargo aircraft. Communications include voice and teletype plus an alert message receive capability. The 7-foot diameter short-back-fire antenna is mounted on the shelter and stowed out of sight when in transit. The engine generator and fuel are trailer carried. For Apollo 11, four TRC–157s were used. One was part of the Army station in Hawaii, two were at the Air Force station at Scott Air



TACSATCOM Terminal AN/TRC-157



TACSATCOM Terminal AN/TRC-156

Force Base, Ill., and the fourth was operated by the Marine Corps at Cape Kennedy.

Navy Terminal Aboard U.S.S. Hornet. The ship-to-shore satellite communications terminal was designed and assembled at the Naval Electronics Laboratory Center (NELC), San Diego, Calif. Housed in an 8 by 12-foot portable enclosure on the recovery ship's flight deck, it consists of two FM transmitters, two FM receivers and auxiliary equipment. Two communications antennas were used for the Apollo 11 mission.

Apollo Range Instrumentation Aircraft (ARIA). This UHF Air Force EC–135N jet transport system, modified as flying communications post to support the Apollo moon flight program, includes two antennas (multiple cross dipole and single vertical monopole), transmitter, receiver, beacon receiver, common and FM modes and alert message receiver.

The TACSATCOM Program is a cooperative research and development effort of the Department of Defense, directed by the Tactical Satellite Communications Executive Steering Group (TSEG), headquartered in the Pentagon and staffed by members of the Army, Navy, Air Force and Marine Corps. The program was established to develop a system that can provide communications for the tactical user and thereby satisfy a critical communications need of the nation's combat forces.

An in-depth feasibility test program is now in progress to determine the technical capabilities and develop the operational procedures required for a tactical satellite communications system. Coordinated tests are being performed under the direction of the TACSATCOM Joint Service Test Directorate HQ at Army SATCOM Agency, headed by an Air Force officer with Army and Navy deputies.

STRATCOM Supports Apollo 11 Lunar Landing Project

Global telecommunications of the Army's Strategic Communications Command (STRATCOM) gave essential communications-electronics support to NASA's Apollo 11 lunar landing project, with particular emphasis on the planned recovery of the spacecraft.,

STRATCOM, with operations in 25 nations of the world, was ready with facilities and personnel in Europe, Central America, North Africa and the Orient to back up NASA's exacting tracking and telemetering requirements for the Apollo flight.

STRATCOM, headquartered at Fort Huachuca, Ariz., has supported virtually all NASA space shots which place a premium on reliable and timely communications.

STRATCOM personnel at Pirmasens and Vaihingen in Germany, at Corozal in the Panama Canal Zone, at Asmara in Ethiopia, and at Fort Buckner, Okinawa, were ready to use both voice and teletype circuits on an "if needed" basis by way of high-frequency, microwave and submarine cable.

STRATCOM helped also to provide television coverage for the State of Alaska, which lacks a live TV reception capability, by assisting in arrangements to operate a transportable satellite ground terminal near Anchorage.

Expandable Structure Developed as Moon House

One of the concepts advanced as an abode when man first lives on the moon has much the appearance of a restructured version of the U.S. Army's MUST (Medical Unit Self-contained Transportable) hospitals.

Fabrication of a full-scale research model of an inflatable moon house under contract with Langley Research Center, National Aeronautical and Space Administration, was announced by Goodyear Aerospace Corp. (GAC).

MUST inflatable units developed by the U.S. Army under contract with Garrett AiResearch Corp., and first unveiled Feb. 24, 1965, at Brooke Army Medical Center, Fort Sam Houston, Tex., have been impressively proving their merit in Southeast Asia.

Like the MUST units, which contain a utility system providing electric power, air conditioning, heating, hot and cold running water and other living facilities, the Goodyear concept of a moon house would provide living accommodations "almost earth-like," including voice and telemetry links with earth communications.

Newly developed materials for use in the moon shelter now are being studied by GAC under a 9–month contract with NASA-Langley. GAC's task is to advance materials technology to the point where mission hardware can be built for use on the moon in the 1973–75 period.

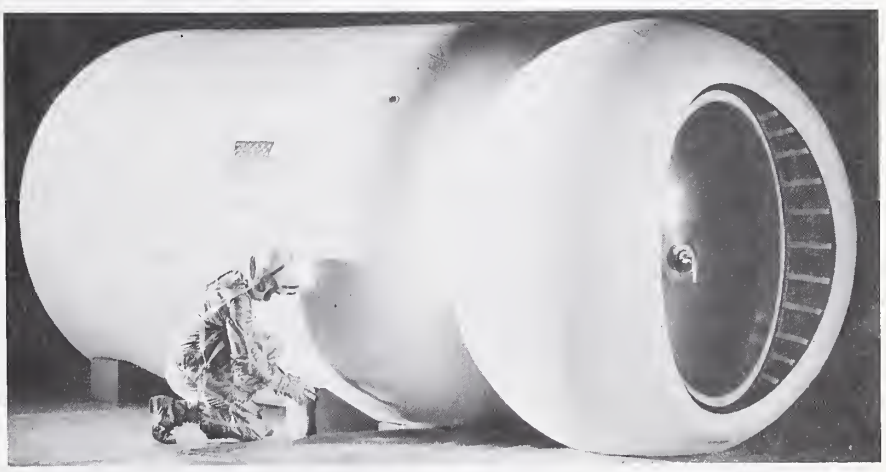
The lunar home, as envisioned, would maintain a constant temperature of 75 degrees, even though the moon's temperature may range from minus 300 degrees to plus 250 degrees Fahrenheit. Carried in a canister aboard the lunar transport vehicle, the home would be unpacked before landing and inflated by compressed oxygen.

Supplies to support two men for eight days and the interior support equipment would be transported in canisters similar to that containing the moon house during the journey to the lunar surface.

GAC explained that the moon house concept, although four years old, is still a shelter contender for "when" and "if" man lives on the moon. A shelter is not needed in the Apollo program at present because lengthy lunar stays are not planned.

Over-all measurements of the moon house on display at NASA-Langley are 13 feet long and 7 feet in diameter. The research model uses high-strength stainless steel filaments in a composite with other flexible materials. Entrance is through a shelter-airlock door that helps assure a constant temperature and a life-supporting environment.

Materials used in the outer wall would make the structure highly resistant to meteoroids, thermal radiation and temperature extremes likely to be faced in the moon environment.



Research Model of Inflatable Moon House

Institute of Land Combat Completes Move Into New Building

Relocation of the Institute of Land Combat (ILC) of the United States Army Combat Developments Command from Fort Belvoir, Va., to the Hoffman Building, Alexandria, Va., has been completed.

The ILC shares its new headquarters with the Advanced Materiel Concepts Agency (AMCA) of the Army Materiel Command and the Intelligence Threat Analysis Group (ITAG), Office of the Assistant Chief of Staff for Intelligence.

The Advanced Concepts Organizations (ILC and AMCA, supported by the ITAG) have the mission of preparing recommended designs of a Land Combat System for the Army in the 1990s.

These advanced concepts will guide the development of selected major materiel through the formulation stage and for conducted related studies and analyses essential to development of Army doctrine, materiel and organization.

Established in April 1967, the ILC, commanded by Maj Gen O. A. Leahy, has had a phased buildup because of the sequential tasks involved in its mission. It is organized into a Command Group, Management Directorate, and four study directorates—Environments and Threats, Military Technology, Conceptual Design and Evaluation.

The Environments and Threats Directorate (ETD), with the assistance of ITAG, prepares the Conflict Situations and Army Tasks Study. World, regional and country environments are projected into the time period 1985-1995.

Potential Conflict Forecasts (PCF) are evolved from this projection, including country against country, bloc against country, bloc against bloc.

From analyses of these projections, the ETD identifies Plausible Conflict Situations (PCS) which may result in U.S. Army involvement. The PCS are then grouped by level of conflict, and other factors into Representative Conflict Situations (RCS). Reducing the number of RCS to fewer, but representative situations, makes possible a detailed analysis.

From the RCS, the ETD derives tasks which the Army in the field must be able to perform in the 1990s. The tasks may be the same, be similar, or vastly different from those confronting the Army today.

Plausible materiel options for the 1990s are compiled by the Directorate of Military Technology (DMT), working in close coordination with the AMCA. The DMT prepares a catalog describing materiel systems which could be type classified by 1985 and issued to Army units by 1990.

Identified by the DMT are the Functional Objective, statement of tasks, in terms of the five functions of land combat—firepower; mobility; intelligence; command, control and communications; and service support. These are provided to the AMCA as problem statements. To date 165 Functional Objectives are identified.

With input concerning Army tasks and materiel options, the Conceptual Design Directorate will develop visualizations of combat systems to accomplish Army tasks in the 1990s. Three or four Conceptual Approaches will be developed from the selected visualizations.

Conceptual Approaches are then sent to the 17 CDC agencies, representing every branch and arm of the service, for review, comment and added input. Agencies describe in detail how their particular branch or function would accomplish the mission specified under each approach.

Comments are given to the Conceptual Design Directorate's independently functioning teams. Each has the task, in continuing collaboration with the agencies, for the determination of a conceptual design of the Land Combat System of the 1990s.

Through guidance to each team, the ILC seeks to insure different conceptual designs. Formulation of conceptual designs is a combination of military subjective thinking, imagination and experience.

When the Conceptual Designs are completed, each capable of adequate response to a full range of tasks envisioned, the Evaluation Directorate will make an objective Preferential Analysis. This will identify relative advantages, disadvantages, risk, cost and effectiveness of each design.

Each design will be ranked in order of preference, with the selection of one as the recommended basis for future development. Independent views of large numbers of experienced officers and planners will be obtained and study results will be reviewed by major Army commanders worldwide.

The conceptual designs, with recommendation for adoption, then will be submitted to the Department of the Army for final determination, which is expected by mid-1972.

Approval of the concepts study and the specific operational capabilities objectives will form the basis for future developmental actions by the Combat Development Command and the Army Materiel Command.

The ILC will repeat the Land Combat System study cycle whenever it seems necessary to determine the future design of the U.S. Army.



Maj Gen Osmund A. Leahy

Maj Gen Osmund A. Leahy took command of the USACDC Institute of Land Combat in January 1969, after serving since November 1968 as deputy CG and chief of staff of the USACDC.

General Leahy's military career began with enlistment in the Navy. Granted a discharge to enter the U.S. Military Academy, he was graduated in 1940 with a BS degree in engineering. During World War II, he participated in the campaigns in Sicily, Naples-Foggia, Normandy, Rhineland, Ardennes-Alsace and Central Europe.

Since graduating from the Army War College in July 1956, he has served as commander, 505th Airborne Infantry Regiment and then CO of the 505th's 1st Airborne Battle Group; executive and then chief, Personnel Services Division, ODCSPER, HQ DA; senior adviser, 5th Division, V Corps (Korean); senior adviser, DCSPER, Republic of Korea Army; and

Chief of staff, U.S. Army Element, Military Assistance Group to Korea; chief, U.S. Military Training Mission to Saudi Arabia; chief of staff, HQ XVII Airborne Corps, Fort Bragg, N.C.; CG, II U.S. Army Corps, Fort Wadsworth, N.Y.; CG, 7th Infantry Division, Eighth U.S. Army, Korea.

Col Norman Farrell, ILC deputy commander, has served with the Combat Developments Command since 1963 as chief, War Games Plans Division and commander of the Institute of Special Studies. He was commander of the ILC during its formative years.

As an Infantry officer, he has held



Col Norman Farrell



Ward H. Van Atta



Col Leon S. Lawrence

various battalion and regimental command assignments. His awards include the Legion of Merit with OLC, Distinguished Service Medal, Army Commendation Medal and the Philippines Campaign Medal.

Col Farrell has a master's degree in electronics from the University of Illinois and has completed courses at the Command and General Staff College and the Army War College.

Col Melvin H. Rosen, a 1940 U.S. Military Academy graduate, is special assistant to Maj Gen Leahy and also has served as director, Environments and Threats, of the ILC. In World War II, he fought at Bataan, was one of the survivors of the "Bataan Death March," and was a prisoner of war in Japan from 1942 to 1945.

Col Rosen is a graduate of the Army Command and General Staff College and the Army War College. In recent years he has served as commander of the 775th Field Artillery Battalion in Germany, commander of the 20th General Support Group, U.S. Army Support Command Korea, and with the Defense Intelligence Agency, Washington, D.C.

Ward H. Van Atta became special assistant to General Leahy after employment in private industry following retirement from military service. He is a former commander, Army Map Service and the Engineer Topographic Laboratories, Fort Belvoir, Va.

Graduated from Michigan State University with a degree in engineering in 1937, he earned a master's degree in engineering from Harvard University in 1947. He also has a master's in international affairs from George Washington University, and is an Army War College graduate.

During World War II, he participated in the Omaha Beach Assault landing, later in European Theater Campaigns, and then in the Far East. His decorations include the Legion of Merit and the Army Commendation Medal, both with Oak Leaf Clusters.

Col Thomas B. Ross Jr. has been the ILC Director of Evaluation since March 1967 and was previously chief, War Games Division, USACDC Institute of Special Studies. Graduated from Wofford College, he also has completed the Army Command and General Staff College residence course, the Army War College and the Advanced Infantry Officer's Course.

Assigned to the Pacific Theater during World War II, he served in the North Solomons campaign. During the past 10 years his assignments included a variety of command and staff positions with Infantry groups, operations officer at the Army Infantry School and deputy chief of staff for Operations, Korean Military Advisory Group. His decorations include the Legion of Merit.

Col Leon S. Lawrence, ILC Director of Conceptual Design, was assigned to this duty in January 1969, following three years as deputy and then chief, Army Section, MAAG, Denmark, and a tour with the Office of the Deputy Chief of Saff for Operations, HQ DA, Washington, D.C.

Following graduation from the University of Florida in 1940 with a degree in economics, he participated in five campaigns in Europe during World War II. He also served as a field artillery battalion commander in four campaigns during the Korean conflict. Among his awards are the



Col Melvin H. Rosen



Col Thomas B. Ross Jr.



Col Joseph D. Mitchell

Army Commendation Medal, Republic of Korea Presidential Unit Citation, Bronze Star with OLC, and Legion of Merit with OLC.

Col Joseph D. Mitchell commanded the U.S. Army Concept Team in Vietnam in 1968 after serving there as deputy chief of staff, II Field Force. He is currently assigned as ILC Director of Environments and Threats.

In 1962–63, he served with the Combat Developments Command's Institute of Advanced Studies, in 1964 was assigned to the CDC Programs Division's Advanced Tactics Project, and then became commander, 2d Brigade, 101st Airborne Division.

He served in New Guinea and the Philippines in World War II, and has been awarded the Silver Star, Bronze Star, Legion of Merit, Army Commendation Medal, Vietnamese Gallantry Cross and Vietnamese Army Distinguished Service Order.

(Continued on page 30)

ILC Completes Move Into New Building

(Continued from page 29)

Col Mitchell was graduated with honors from Johns Hopkins University, has a master's degree in political science from Princeton University, and is a graduate of the Army Command and General Staff College, and the Army War College.



Leo J. Misenheimer

Leo J. Misenheimer has served as the ILC director of Military Technology since September 1968, following 13 years with the Nuclear Power Field Office, Army Nuclear Power Program, Army Engineer Reactors Group, Fort Belvoir, Va.

After receiving degrees in civil, architectural and electrical engineering from North Carolina State College, and doing graduate work in meteorology at the University of Chicago, he worked with the Tennessee Valley Authority. He also was graduated from the Oak Ridge (Tenn.) School of Reactor Technology with a degree in nuclear technology.



Walter W. Wendt

Walter W. Wendt is ILC Director of Management, a position he has held since April 1968. When he retired from military service in 1966, he was commandant, Army Management School, following a 3-year tour as a faculty member, Army War College.

From 1957 to 1959, he was deputy, Programs Analysis Group, Office of the Army Chief of Staff; 1959-60, staff officer, Office Joint Chiefs of Staff; and 1960-61, deputy chief of staff, United Nations Command/U.S. Forces Korea. He has been awarded the Legion of Merit with three OLC; Bronze Star, Distinguished Service Medal and campaign stars for World War II service in Africa, Europe and the Middle East.

Graduated from Creighton University with BSc and LLB degrees, he has an MBA degree from Stanford University. He attended the International Business Machines Corp. course for executives in 1965, and is a graduate of the Command and General Staff College, Armed Forces Staff College, National War College, Army War College, and AMETA Operations Research Course.

Latta Taps Richards to Direct ECOM Avionics Laboratory

Appointment of Lt Col Everett D. Richards as commander and director of the Army Electronics Command's Avionics Laboratory was announced July 17 by Maj Gen William B. Latta, CG of ECOM.

Col Raymond L. Martin, who held those titles, has been assigned as chief, Communications-Electronics Division, Office of the Chief of Research and Development, HQ DA, Washington, D.C.

Col Richards, 41, is a native of San Antonio, Tex., an Army aviator, and a 1952 graduate from the United States Military Academy. He holds an MS degree in physics from the University of Virginia (1959) and was re-recently graduated from the Army War College.

During four years experience in Pentagon assignments, he served as avionics officer in the Office of the Chief of Research and Development after duty as navigation officer in J–6 (Communications Electronics Directorate), Office of the Joint Chiefs of Staff.

Col Richards completed flight training in 1955 at Fort Rucker, Ala., and in 1963-64 was assigned there with the Aviation Test Board, Avionics Division. He served (1959-62) at Fort Huachuca, Ariz., as chief, Infrared Branch, Combat Surveillance Department.

As executive officer and flight team leader of the 23d Special Warfare Aviation Detachment in Vietnam (1962-63), he earned the Distinguished Flying Cross and Air Medal with two Oak Clusters. His other decorations include the Joint Service Commendation Medal and Army Commendation Medal (with OLC).



Lt Col Everett D. Richards

Littlejohn Heads TECOM Air Defense Test Directorate

Assignment of Lt Col (Col designate) John C. Littlejohn, a 42-year-old air defense artilleryman, as head of the Air Defense Materiel Testing Directorate, Army Test and Evaluation Command, Aberdeen (Md.) Proving Ground, has been announced.

Until reassigned recently he was with the Army element of the Continental Air Defense Command, Ent Air Force Base, Colo, for three years. He is now responsible for directing TECOM test and evaluation programs involving all types of weapons, weapon systems and allied equipment used for air defense purposes, and for test programs.

Col Littlejohn was graduated in 1948 with a BS degree from Hampton Institute in Virginia, where he majored in engineering and mathematics, and is an Army Command and General Staff College graduate.

Commissioned initially in the Coast Artillery Corps, he served in Japan and Korea from 1949 to 1953, participating in three major campaigns of the Korean War with the 933d AAA Automatic Weapons Battalion.

As a guided missile staff officer and instructor, he then served 4½ years at the Antiaircraft Artillery and Guided Missile School.

Subsequent assignments took him to Arlington Hall Station, Va., for duty with the Army Security Agency; to Thule, Greenland, as adjutant and operations officer of the 7th Artillery Group; and to Fort Shafter, Hawaii, for a 3-year tour with HQ U.S. Army Pacific as guided missile officer on the G3 staff.



Lt Col John C. Littlejohn

CDC Task Force RIPOSTE Deals With Surveillance, Night-Vision, Acquisition

Responsibility for planning and monitoring the integration of Southeast Asia Night Operations (SEA NITOPS) capability into the Army under central control is assigned to Task Force RIPOSTE, created by the U.S. Army Combat Developments Command, Fort Belvoir, Va.

The entire first generation of night-vision devices resulting from recent great advances in technology will become part of the Army inventory as soon as possible. RIPOSTE's role is to validate the requirements for the equipment, write the doctrine for its use, place it within the Army's Tables of Organization and Equipment, and be responsible for evaluation of field and troop tests.

A long-range mission will be to develop the requirements for a second generation of equipment targeted for the Army through 1985. RIPOSTE, a fencing term for "a quick reaction to an opponent's thrust or parry," has the objective of giving the U.S. Army a family of devices to fend off enemy attacks in darkness.

Basically, RIPOSTE is concerned with night surveillance, observation and target acquisition as related to the individual rifleman, to the artillery battery miles away, to the armor or mechanized force on the move, and to the helicopter over the battlefield.

Almost on a "crash project basis," RIPOSTE's goal is to bring the first generation of night-vision devices into general Army use, and prepare the way for development and integration of more highly sophisticated second-generation equipment for the Army of the future.

Other intelligence-producing methods, such as the long-range patrol, aerial photography and prisoner interrogation will be coupled with the RIPOSTE family of devices to produce knowledge of the enemy's plans, personnel equipment and capability to the commander and his staff for timely evaluation.

SEANITEOPS (Southeast Asia Night Operations Study), for which the Combat Developments Command shares responsibility, deals with monitoring and evaluating a major part of the RIPOSTE work, which is not limited to Vietnam requirements; it will apply to Army capabilities in all environments in any type of warfare.

Considerations in stating requirements for a night-vision devices are that it should be lightweight for man, vehicle and helicopter carry, and should also be rugged, air-droppable if possible, easy to maintain and require a short period of training time in its use. Above all, it should be relatively undetectable when in operation.

Detection of the enemy at night currently relies upon three general types of devices. One is radar, which can emit a signal and through a readout identify men and material. Another night-vision device amplifies existing celestial light and permits a degree of normal daylight vision. Sensors chemically, mechanically, magnetically or electronically detect the enemy.

The Starlight Scope, mounted on the M–16 rifle, is an electro-optical instrument. The battery-driven device amplifies existing light (starlight or moonlight), is completely passive in use and gives ranges of vision up to 400 meters. A similar device can be mounted on crew-served weapons, such as the machinegun, with effective ranges about double the capability of the Starlight Scope.

Sensors open up avenues of development and employment all but undreamed of a dozen years ago. Sensors which detect human, mechanical or ferrous properties are equally advantageous day or night and may be of the olfactory ("people-sniffer") magnetic and electronic type.

Sensors set in place from the ground or air can monitor all types of enemy movements, activities and equipment.

Advanced sensors ideally could identify the passage of a small vehicle, a heavy tank or even a motor cycle, and be able to count vehicles as well as identify the general types.

The concept of magnetic sensors is that they would register significant amounts of ferrous metals and, when used in conjunction with a people sniffer device, tell the difference between an innocent civilian or a weapon-carry enemy.

The imagination of the CDC RIPOSTE planners and the ability of industrial technology impose the only limits on future sensor use.

Information from the sensors would be relayed to collection centers removed from the sensors, where the information would be compiled and evaluated, someday perhaps by computers. Artillery, air strikes, or field operations would follow swiftly to thwart or disrupt enemy objectives.

Deputy ACSFOR Refutes Vietnam Helicopter Critics

In refutation of "erroneous and misleading" publicity regarding U.S. helicopter operations in Vietnam, Maj Gen Robert G. Williams, Deputy Assistant Chief of Staff for Force Development, offered impressive statistics at a Pentagon press conference.

A steady increase in enemy firepower, including automatic rifles and machineguns along with antiaircraft weapons, has been countered, he said, by mounting machineguns on the side of troop-carrying helicopters and escorting them with rocket-carrying Cobra aircraft.

"During 1962," he pointed out, "the loss rate for helicopters in Vietnam was one to every 5,290 sorties. As a result of our improved weaponry, tactics and techniques, in calendar year 1968 we lost only one helicopter in every 14,619 sorties.

General Williams said that in 1962 the loss of one helicopter represented the loss of one percent of the inventory. An equivalent loss today would be 36 aircraft.

"This loss rate was established over an extended period of time," he explained. "However, it would not be consistent on a day-to-day basis. I can remember no time we experienced high aircraft loss rates when we were not at the same time inflicting even higher kill rates on the enemy."

The general disputed claims that the helicopter is a fragile piece of machinery by citing its capability of taking considerable punishment, sustaining many wounds and, because of the nature of its flight characteristics, achieving a survivable landing for the aircraft and crew.

In support of that viewpoint, he cited the first OH–6A Cayuse to complete 1,000 hours of combat flying. Shot down and recovered five times, it received fire on 57 occasions and survived 150 bullet strikes—and then was sent to the U.S. for major overhaul and further Vietnam service.

Helicopter capabilities, he said, have enabled U.S. forces to be successful in tracking down and coping with a guerrilla force with a strength ratio of six to one, compared to the British experience in Malaysia and the French in Southeast Asia, where a ratio of ten to one was required.

Translated into terms of troop strength required, as pointed out by General Westmoreland last November, about 2.5 million more men would have been required in the Vietnam war without the capabilities of helicopters to serve many needs.

"The question, therefore, is which can we better afford," General Williams said, "the dollars to pay for lost aircraft or the time and lives of so many Americans?"

WSMR Contract Enters Facilities Program Phase IV

Construction of instrumentation and support facilities at White Sands (N. Mex.) Missile Range under a $1,274,280 contract awarded recently is Phase IV of the long-range program designated Range Instrumentation Facilities.

The first phase was completed during FY 1966 and the other phases are now nearing completion. Phase IV is slated for completion by July 1970.

This continuing program provides facilities to accommodate new and improved instrumentation systems supporting the rocket and missile programs of testing at White Sands Missile Range.

Phase IV will provide a communications center at the Small Missile Range (SMR), a mobile radar installation site, and facilities at both the north and west areas of Holloman AFB for range, logistic, maintenance and supply operations.

The SMR work will consist of constructing a masonry communications building, 40 feet wide and 75 feet long, which will house a control center, a maintenance shop, office space, and mechanical and electronic equipment rooms. The building will be used by Communications Directorate, National Range Operations (NRO).

Twenty-five miles north of the SMR, facilities will be built for a mobile radar installation to be designated RAD Site. The using agency will be the Radar Division of Data Collection Directorate, NRO.

In the west area at HAFB, four new facilities will be constructed. These will include a 40– by 88–foot warehouse, a 50– by 184–foot vehicle and generator maintenance building, a service station and shop building, and a 90– by 86–foot tehnical operations facility. The latter will be an addition to Building 841 in the HAFB west area.

The four facilities in the west area will be used by the Data Collection directorate of NRO. In the north area at HAFB, a 60– by 80–foot vehicle maintenance building, and a 20– by 56–foot range recovery operations building will be erected. Using agencies will be WSMR's Maintenance Directorate and the Recovery Division of Range Services Directorate.

R&D Newsletter Says 'Well Done' to Staff of KYSU

One of the sources of regret of the *Army Research and Development Newsmagazine* editorial staff for several years is that lack of space has prevented proper recounting of the historic role of the U.S. Army Corps of Engineers in the Vietnam conflict.

Consequently, it was a pleasure to receive from Edward Greene of the Office of the Chief of Engineers, HQ DA, the second edition of *The KYSU'*. This is a slick quarterly magazine that does give deserved recognition to the activities of the U.S. Army Engineers in Vietnam.

The announced purpose of *The KYSU'* (pronounced Key–soo, Vietnamese for engineer) is to portray the work of the U.S. Army engineers not only in meeting military requirements, but in "nation-building and the effect of his work on the economy . . . opening the countryside and providing a network of roads that is literally binding the Republic of Vietnam into a politically and economically stable nation"

Civic actions of the U.S. Army Engineers, however, go far beyond the normal construction activities; they reach deeply into the humane aspects of an inhumane war (as all wars are) to convey the compassion of American fighting men for Vietnamese civilians and their suffering.

The KYSU' touches rather lightly on these civic actions in the area of Bao Loc, the main base camp for the 116th Engineer Battalion. (Actually, the *Army Research and Development Newsmagazine* has been receiving for a number of years some of the finest human interest stories of the Vietnam fighting from the reports of the engineers' civic actions.)

So the *Army R&D Newsmagazine* staff salutes the originators and the staff of *The KYSU'* and says "Well done!"

Lt Col Bass Directs WD&E Labs at Edgewood Arsenal

Assignment of Lt Col Sampson Howard Bass Jr., a career Chemical Corps officer since 1951, as director of the Weapons Development and Engineering Laboratories, Edgewood (Md.) Arsenal, was announced July 22.

Col Bass served at the arsenal in 1957–60 with assignments in the Procurement Agency, the Chemical Materiel Command, and from 1959–60 as deputy commander of the post. His most recent assignment was with the War College at Carlisle Barracks, Pa.

A native of Washington, D.C., he received a bachelor's degree from Virginia Military Institute in 1951 and a master's degree from Harvard University in 1957. He has completed the Infantry School, the Chemical Corps School, Command and General Staff College, and Army War College.

In 1962 he served in the Office of the Deputy Chief of Staff for Operations, HQ DA, as a staff officer and was then assigned to the Office of the Chief of Research and Development as head of the Weapons Branch Chemical-Biological Office.

In 1966–67 he was assigned to HQ U.S. Army, Pacific, at Fort Shafter, Hawaii, and was then given duty with the Military Assistance Command, Vietnam, for one year (1967–68) before attending the War College.

Among his decorations and awards are the first Oak Leaf Cluster to the Legion of Merit, the second Oak Leaf Cluster to the Air Medal, the fourth Oak Leaf Cluster to the Army Commendation Medal, first Oak Leaf Cluster to the National Defense Service Medal, the United Nations Service Medal, Korean Service Medal, Free World Services Medal, Vietnamese Service Medal, Vietnam Hazardous Service Medal, the General Staff Identification Badge, the Parachutist Badge, and the Korean Presidential Unit Citation.



Lt Col Sampson H. Bass Jr.

Edgewood Arsenal Honors Hebbeler Upon Retirement

Brig Gen James A. Hebbeler retired July 24 after 29 years of military service and was honored at Edgewood Arsenal, Md., with a full military parade and a musical salute.

Formerly head of the Edgewood Chemical Research and Development Laboratories, now a complex of three laboratories, he has served since June 1966 as director, Chemical, Biological, Radiological (CBR) and Nuclear Operations, Office of the Assistant Chief of Staff for Force Development, HQ DA, Washington, D.C.

Lt Gen Arthur S. Collins, Assistant Chief of Staff for Force Development, and Col Paul R. Cerar, Edgewood commander, accompanied General Hebbeler on the parade stand.

N.Y. Times Credits CRREL's Rare Capabilities

Unique capabilities of the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) received feature treatment in a *New York Times* article July 21 on cooperation with industry in an historic effort to chart a feasible Northwest Passage route through thick sea ice to new oil fields in northern Alaska.

Reported in the June-July edition of the *Army Research and Development Newsmagazine*, page 9, this effort involves CRREL scientists who are world renowned for their broad knowledge of the varieties of ice formation in the Far North. They are working with the Humble Oil Co., as approved by Secretary of the Army Stanley R. Resor, to provide assistance on a cost-reimbursable basis.

William D. Smith, in a special report to the *New York Times*, states that if successful the trip of the *S.S. Manhattan*, a 1,000–foot, 150,000–ton deadweight tanker specially strengthened to go through ice that may be 100 feet thick in some places, will be of vast economic importance.

". . . The black gold from Alaska could be brought to the markets on the East Coast of the United States at 60 cents a barrel cheaper than other methods, a saving that could total $1 million a day once the oil starts flowing," the article says.

CRREL, an institution originated by the U.S. Army Corps of Engineers, turned over to the Army Materiel Command in the 1962 Army-wide reorganization and recently returned to CofEngrs control, is providing the technical know-how on the expedition to chart the treacherous passage.

Present plans call for four CRREL scientists to participate in the expedition, although probably only two at any one time. Andrew Assur, the CRREL chief scientist who figured in the Army's feat of drilling to bedrock 7,101 feet below the Antarctic Icecap Jan. 29, 1968, after months of effort, will be one of them.

(*The drilling project, sponsored by the National Science Foundation as part of its continuing Antarctic research program, was directed by B. Lyle Hansen, another internationally known CRREL expert, who headed an 8-man CRREL team in which Anthony B. Gow, geologist, and Herbert T. Ueda, mechanical engineer for drilling, played key roles.*)

Another who will figure prominently in the Northwest Passage expedition is CRREL scientist Willy Weeks, about whom William D. Smith writes:

"One of the reasons for Dr. Assur's confidence is Willy Weeks, who is considered one of the world's leading experts on the subject of ice . . . a friendly, unassuming man whose mannerisms give him the appearance more of a high school basketball coach than a world-renowned scientist. . . ."

Additional CRREL ice experts who will take part in the expedition are Guenther E. Frankenstein and Donel E. Nevel, it has been announced.

Raymond Directs Army Engineers' Military Construction

Brig Gen Daniel A. Raymond assumed duties as director of military construction in the Office of the Army Chief of Engineers, Washington, D. C., Aug. 1, succeeding Maj Gen Carroll H. Dunn, who took over as Deputy Chief of Army Engineers.

General Raymond was director, Construction Operations, Office of the Assistant Secretary of Defense (Installations and Logistics).

General Raymond was district engineer, Mobile, from 1961 to 1964. After a year in Washington, D. C., in the Army Office of Personnel Operations, he served for nearly two years in Vietnam as the deputy assistant chief of staff (Logistics) for the Engineering, Military Assistance Command (MACV) and as director of construction, MACV.

General Raymond will be responsible for military construction within the Army; also, for construction and design work performed for the Air Force and the National Aeronautics and Space Administration, and other U.S. Government agencies as assigned. He also will be responsible for the Army Nuclear Power Program and specialized fall-out engineering support for Civil Defense. The dollar value of work assigned to the Directorate totals about $1 billion a year.

CDC Assigns Sutherland as CO Of Instrumentation Support

Command of the Instrumentation Support Group, Army Combat Developments Command Experimentation Command, Fort Ord, Calif., was assumed late in July by Col Warren Sutherland, who succeeded Col Arthur F. Mitchell, reassigned to Vietnam.

Except for a year in Vietnam, Col Sutherland has been with CDCEC since February 1964, when he returned from duty in Germany as inspector general, 7th Army Support Command.

At CDCEC, he has served as chief of Project Teams I, III and IV as well as CO of the 4th Battalion 73d Armor at Camp Roberts and deputy CO of the old Experimentation Support Group. From April 1966 to April 1967, he was director, Plans and Operations Section, HQ U.S. Army Support Command in Qui Nhon, Vietnam.

Natick Assigns DoD Food Program Assistant

Dr. Edward E. Anderson has been named special assistant to the scientific director, U.S. Army Natick (Mass.) Laboratories, for the Department of Defense Food Research and Development Program.

Dr. Anderson will direct basic and applied research performed at Natick in support of the food program for the U.S. Armed Forces. The DoD recently assigned to the Army sole responsibility for research, development, testing, and engineering on food and related packaging, service equipment, and systems analysis studies.

About 300 scientists, engineers, and food technologists are engaged at Natick's Food Laboratory, General Equipment and Packaging Laboratory, and Pioneering Research Laboratory, in various aspects of the DoD program.

Natick Laboratories was first assigned responsibility for all Army R&D in food and subsistence packaging in 1963, when activities of the Food and Container Institute at Chicago were transferred to Natick.



Dr. Edward E. Anderson

Until appointed to his new position, Dr. Anderson headed the Plant Products Division at Natick. Formerly a research professor at the University of Massachusetts' Department of Food, Science and Technology, he also has served as a senior project leader at Arthur D. Little, Inc., Cambridge, Mass.

He is an active member of the Institute of Food Technologists, a Fellow of the American Association of Science, and is affiliated with the American Chemical Society, New York Academy of Science, Defense Supply Association, and Armed Forces Management Ass'n.

Australian Scientist Gains Acclaim as ETL Director

Australia's substantial contribution to the successful operation of the U.S. Army Engineer Topographic Laboratories (ETL), Fort Belvoir, Va., is Dr. Desmond Conroy O'Connor, ETL Research Institute director and scientific adviser to Col J. R. Oswalt Jr., CO.

Among Fort Belvoir's some 5,500 civilian employes, Dr. O'Connor has won acclaim for outstanding scientific achievements in support of ETL's new concept of mapping. He has a staff of some 20 scientists, technical and administrative personnel.

U.S. Army military operations, as linked to rapidly changing requirements extending to almost any part of the world, have shown that the classical method of providing mapping information frequently cannot cope realistically with requirements.

The ETL concept is an integrated topographic system using a central data bank and having the capacity for rapid updating. Output displays will range from conventional maps through TV-type displays, photomaps and computer-generated maps.

A fundamental feature of the ETL Research Institute is that it must provide conceptual guidance for the future as well as responses to scientific problems related to ongoing developments.

Surveying, geodesy and photogrammetry educational institutions in the U.S. are producing one graduate for every 5,000,000 population, compared with one for 100,000 population in Europe.

In an effort to bridge this gap, Dr. O'Connor and his staff maintain close liaison with universities offering advanced studies in areas related to the topographic sciences, as well as with European centers of learning.

Purdue University, California Institute of Technology, University of Hawaii, University of Washington, University of Illinois and Ohio State University are among U.S. institutions specializing in the areas related to topographic sciences.



Dr. Desmond C. O'Connor

In Europe the group includes the Royal College of Art in London, England, the University of Stuttgart, Germany, the University of Gratz, Austria, and International Center for Aerial Survey and Earth Sciences, Delft, The Netherlands.

Under Dr. O'Connor's direction, the ETL Research Institute conducts a continuing program to encourage the exchange of information among leading U.S. and foreign scientists.

Invited to the ETL during the summer, foreign scientists share experience with the institute staff. ETL scientists, in turn, conduct seminars and lectures at the universities to foster interest in advancing the state-of-the-art in the topographic sciences.

The Research Institute capability continues to be strong in the classical areas of physical geodesy, gravity, satellite geodesy, geometric geodesy and astronomy. However, a whole new range of experiments in the physical sciences is being introduced into the ETL program.

One example is studies in bionics, being conducted to determine if processes taking place in living organs, such as the eye, offer possible solutions to engineering problems of pattern recognition, and data storage and compaction.

Among other relatively new areas of Research Institute exploitation are the use of lasers and holography. Lasers are finding application in measurement of absolute gravity, surveying aligment and other uses.

Holograms are being prepared from aerial photgraphs. Favorable findings of efforts to ascertain if accurate dimensions can be determined from the hologram could accelerate stereoscopic mapping operations.

Two atomic clocks also are being used in the Research Institute to measure geodetic distances. Fundamentals of the photographic and map reproduction processes are being investigated in the chemical lab.

ETL basic research seeks to provide a more precise understanding of theoretical geography and to examine potential applications of its methodology and techniques to military problems.

For example, Dr. O'Connor's group has a continuing responsibility to refine knowledge of the size and shape of the earth and its gravity field as it affects the timing of weapons and missiles. Extensive use of satellites seeks this knowledge on a global scale to serve a need that suddenly became critical in the space age.

Another major challenge to the group is the preparation of scientific forecasts over a 15 to 20-year period in accordance with the implications of scientific and technological progress. This task involves topographic information for complete evaluation of strategic and tactical factors.

"We are supporting this new concept," Dr. O'Connor said, "with a multidisciplinary research effort to ensure continuing deployment of new systems and techniques in the field and at all levels of staff. Topography is an old art, but we believe we are bringing it into the modern age."

AVSCOM Awards Engine Contract

The U.S. Army Aviation Systems Command awarded a $7,308,312 modification to a previously awarded contract for T53–L–13A gas turbine engines for use in the Army aircraft program. The order went to AVCO Corps., Lycoming Division, Stratford, Conn.

Coe Succeeds Ross at Deseret Test Center Chief of Staff

Lt. Col George B. Coe, new chief of staff at Deseret Test Center, Fort Douglas, Utah, succeeds Lt Col Paul E. Ross, who was reassigned to the Office of the Deputy Chief of Staff for Logistics, HQ DA, Washington D.C.

Lt Col Coe has served at Deseret since June 1968, when he was reassigned from the Office of the Secretary of Defense. He was with the Office of the Deputy Chief of Staff for Personnel, HQ DA, following graduation from George Washington University with an MA degree in 1967.

In 1964 he was assigned to the White House as an assistant military aide to the President, and in 1963 was on the staff of the Director for CBR and Nuclear Operations, Office of the Assistant Chief of Staff for Force Development, Headquarters, Department of the Army.

Lt Col Coe was stationed at HQ U.S. Army Pacific and the Field Requirements Agency, Fort McClellan, Ala, for five years, before completing the Army Command and General Staff College in 1963. He served with the 4th U.S. Marine Division in the Pacific during World War II and was commissioned in the Chemical Corps in 1949.



Lt Col George B. Coe

Burke Takes Key Post at Electronics Warfare School

Electronics and Army aviation capabilities developed by Col James L. Burke in military duties for 19 years are combined in his new role as assistant commandant, Electronic Warfare School, Fort Huachuca, Ariz.

Col Burke will be responsible for incorporating advanced concepts of electronic warfare technology into the program at the U.S. Army Combat Surveillance and Electronic Warfare School/Training Center.

From 1962 to 1965, he was at Fort Huachuca as chief, Test Plans and Evaluation Department, U.S. Army Electronics Proving Ground. He was adviser to the commanding general on all Army aviation matters and also chief of the Electronics Test Agency.

While assigned as chief, Logistics Communications Division, Army Concept Team in Vietnam (1965-66), he flew many strategic surveillance missions, receiving the Distinguished Flying Cross and the Air Medal with six Oak Leaf Clusters. He also was awarded the Legion of Merit for achievements in combat surveillance, night vision, aviation electronics and psychological warfare.

Another of his key assignments (1958-60) was chief, Mutual Security Branch, Procurement and Distribution, Office of the Chief Signal Officer. He supervised the electronics needs of more than 70 countries under mutual security and military sales programs.

Rated as a fixed- and rotary-wing pilot, he is one of three Signal Corps colonels with these qualifications. His experience in military electronics dates to 1950, when he was commander, Lab Procurement Office (Research and Development) at the Army Signal Corps Laboratories, Fort Monmouth, N.J.

Among his honors and awards are the Silver Medallion for outstanding service, presented by the Army Aviation Association of America (AAAA), and a plaque for outstanding performance as aviation and electronics special consultant to Maj Gen William B. Latta, CG, U.S. Army Electronics Command.



Col James L. Burke

Industry Asked to Support Nitinol Applications Effort

Nitinol, the alloy described as "the metal with a memory" because it can be formed, contorted into greatly compressed forms, and returned to its original configuration by mild reheating, is proposed for a 2-year research program to exploit utilization.

About 60 industrial representatives attended a recent 2-day meeting sponsored by the Columbus (Ohio) Laboratories of Battelle Memorial Institute. The institute proposed to investigate the engineering/design properties of the nickel-titanium alloy developed by the U.S. Naval Ordnance Laboratory, Washington, D.C.

The objective of the study would be to document behavior of 55-Nitinol under a wide variety of service conditions, including influence of processing variables on its properties. Budgeted at $340,000, the proposal calls for support of 20 to 40 firms.

Discovered nine years ago, 55-Nitinol was given an industrial unveiling only recently, as described in an article on page 10 of the May 1969 edition of the *Army Research and Development Newsmagazine*. The alloy has found little practical application because of lack of understanding of its properties by design engineers.

AVLABS Contracts for 'Copter Transmission Assemblies

Advanced development of a new concept in helicopter transmissions is scheduled over a 36-month period under a $2,553,709 contract announced July 15 by Col Eduardo M. Soler, CO of U.S. Army Aviation Materiel Laboratories (AVLABS), Fort Eustis, Va.

The "Roller Gear" arrangement reduces turbine engine speed to helicopter rotor speed in a single-stage planetary-type transmission.

The contract with Sikorsky Aircraft is for design of an experimental transmission for test in a S-61 helicopter to prove the concept and four transmissions will be developed for ground and flight test.

Flight tests are intended to demonstrate that roller-gear transmissions can improve over-all helicopter performance. Wayne A. Hudgins, AVLABS project engineer, Aircraft Subsystems and Equipment Division, said research and studies show that roller-gear transmissions offer advances in reliability and efficiency of helicopter drive systems.

The number of bearings is substantially reduced and all high-speed bearings are eliminated by locating rollers adjacent to the gear teeth with a diameter equal to gear-pitch diameter.

The arrangement provides for accurately locating the gears. Rollers acting as bearing surfaces remove looseness and bearing play, normally associated with conventional planetary transmissions. The rollers make each gear self-aligning and equal load distribution is achieved.

The military designation of the S-61 helicopter is the HH-3E, which is used by the Air Force, Navy, Marines and the Coast Guard in Vietnam. Nicknamed the "Jolly Green Giant," it is also used by the President of the United States.



ROLLER GEAR transmission (inset) to be installed in S–61 helicopter.

Natick Labs Collect Food, Equipment Info From Vets

Direct flow of critical information from combat veterans to ration, clothing and equipment designers has been established at the U.S. Army Natick Laboratories.

The program's purpose is to fill an information gap left by reports from Vietnam. Under the long-term program, Vietnam combat soldiers visit Natick in small groups for "debriefing"—face-to-face questioning by Natick scientists and technologists to evaluate field performance of Natick-developed items.

The first debriefing at Natick was comprised of a group of six Army officers now stationed at Fort Devens, Mass. The veterans had high praise for the Long-Range Patrol Food Packet, a 1,000-calorie meal for troops in remote areas which cannot be resupplied for up to 10 days. Consisting of a freeze-dried main dish, to which hot or cold water can be added, it may also be eaten dry, if necessary. Eight menus, such as chili con carne, and spaghetti with meat sauce, are available.

The group also suggested several new items such as a bandoleer for carrying packaged foods, and a waterproof case for maps, sketches and papers. HQ First Army has given full support to the program and has agreed to supply as many Vietnam veterans as needed.

An effort is made to group debriefing participants with similar combat backgrounds. The first group at Natick consisted primarily of Infantrymen, the next included supply personnel, and subsequent groups will represent other activities. Future groups may also consist of veterans of a particular region of Vietnam.

To insure field familiarity with NLABS developments, debriefing participants are limited to the rank of captain and below. Strong future participation by enlisted men is being encouraged.

This combat veteran-NLABS interface has also been expanded to other U.S. Army Command Elements.

Chesarek Transfers Task To USALMC at Fort Lee

Reassignment of the training responsibilities of the Army Materiel Command Intern Training Center to the U.S. Army Logistics Management Center, Fort Lee, Va., was announced recently by General F. J. Chesarek, CG of the AMC.

The Intern Training Center (ITC), located at and formerly under the command of the Red River Army Depot, Texarkana, Tex., conducts intern training in depot operations and maintenance management. The center also sponsors graduate programs operated by the Texas A&M University in maintainability engineering, product design engineering, and safety engineering.

In addition to assuming command of the ITC, the Army Logistics Management Center has been assigned the role of assisting HQ AMC in management of its intern training program on a command-wise basis.

This responsibility will include preparation and revision of programs of instruction for 14 separate intern programs, the conduct of common subjects classroom instruction at 26 sites, and assistance to HQ AMC, in the quality control of on-the-job training.

No change in location of the ITC or personnel is anticipated, the AMC stated.

The ITC originated in 1957 as the Supply and Storage Intern Training Program at three training centers—Rossford Army Depot for general supplies, Savanna Army Depot for ammunition supply, and Red River Army Depot for storage.

Effective July 1, 1962 these training programs were consolidated and assigned to Red River Army Depot as the Supply Management Intern Training Program under the jurisdiction of the Supply and Maintenance Command of the Army Materiel Command. In March 1965 the activity was renamed the Logistics Intern Training Center under the CG of the AMC.

ANF Carries Views on What Is an American?

Somewhat belatedly, since the Army News Features distribution failed to cross the editor's desk and it came to attention only as published in The KYSU', *the new quarterly magazine of the U.S. Army engineer troops in Vietnam, we take the privilege of republishing the following:*

WHAT IS AN AMERICAN?

He is the fellow who yells for the government to balance the budget, then takes the last dime he has to make the down payment on a car. He whips the enemy, then gives him the shirt off his back. He yells for speed laws that will stop fast driving, then won't buy a car if it can't make 100 miles per hour.

He'll spend half a day looking for vitamin pills to make him live longer, then drive 90 miles an hour on slick pavement to make up for lost time.

He ties up his dog, but lets his 16-year-old son do whatever he wants.

He will work hard on a farm so he can move into town where he can make more money so he can move back to the farm.

He couldn't fight his way out of a paper bag, but spends 20 bucks for ringside seats, and tells the professionals how to fight.

We're citizens of a country that has more food to eat than any other country in the world—and more diets to keep us from eating.

We're supposed to be the most civilized nation on earth, but still can't deliver payrolls without an armored car.

But, we're still pretty nice folks. Calling a person "A Real American" is the best compliment you can pay him. Most of the world is itching for what we have, but they'll never have it until they start scratching for it.

Col Mullen Assigned to TECOM as Comptroller

U.S. Army Test and Evaluation Command assignment of Col William C. F. Mullen to succeed Col Robert M. Denny as comptroller and director of programs was announced in July. Col Denny retired from active duty after serving as comptroller since 1966.

Col Mullen served until recently as chief of the Programs Management Control Branch of the U.S. Army Element in Ankara, Turkey. In his new position he directs the financial management programs of TECOM and its 15 subordinate elements, located in a dozen states coast-to-coast, in Alaska and in the Panama Canal Zone.

Following two years of duty as an enlisted man, Col Mullen was commissioned in 1944 in the Quartermaster Corps. He was graduated in 1942 from Providence College and received an MBA degree from the Babson Institute of Business Administration in 1956.



Col William C. F. Mullen

Legislation Proposes Changes in Annual, Sick Leave

Legislation to improve administration of the U.S. Civil Service annual and sick-leave system has been proposed to Congress.

The Civil Service Commission has asked Congress for a law that would change the annual leave system in two ways. Other sources are proposing legislation that would enable employes to get the benefit of unused sick leave in added retirement annuities.

As requested by the CSC, the change would allow a federal employe to receive lump-sum payment for all annual leave accrued during the year in which he leaves the federal service. Under present law, an employe is entitled to lump-sum payment for up to 30 days of leave or for the amount carried over into the year in which his separation takes place, whichever is greater.

Thus, if an employe carries 30 or more days of accumulated annual leave into his final year of service, he may receive payment for the amount carried into the year but not for any leave accumulated after the beginning of that year. Most employes elect to use, just before their separation, the amount of leave accumulated during their final year to avoid losing it.

The net result is that the employe is away from his job while expending the leave, and a replacement cannot be hired because technically the position is still filled.

The second change would repeal the ban on the use of annual leave during an employe's first 90 days of employment, except in the case of employes whose appointments are limited to less than 90 days.

In requesting that this ban be lifted, the commission said the 17-year-old law containing the provision has resulted in a large amount of paperwork but that it does not aid management in any respect. In many ways it invokes a hardship on the individual during his first three months of employment.

For example, a new employe moves from New York to Washington to accept a federal job. During his first 90 days he needs time off for making settlement on a new house, registering children for school, and taking care of other personal matters—at a time when he can least afford to take leave without pay.

In requesting these legislative changes, the Commission pointed out that the proposed legislation would in no way modify the ceiling on annual leave which can be carried over from one year to the next, does not challenge the principle of a limitation on accumulation of annual leave, and does not seek to negate the "use it or lose it" principle.

Hand Pump Restyled to Meet Underdeveloped Nations' Needs

After centuries of use in almost every nation in the world, the once-common hand pump has been redesigned under a $58,000 research contract for use in meeting water needs of underdeveloped countries.

Announcement was made recently by Battelle Memorial Institute that its engineers had redesigned the hand pump, under contract with the Agency for International Development, to give improved performance.

Claimed for the new design is that it gives long life under rigorous operating conditions, provides ease of maintenance with simple tools and unskilled labor, is adaptable to deep and shallow wells, and has low production costs requiring minimal investment for manufacture in developing countries.

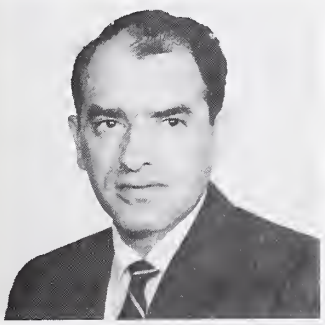
East Pakistan, India, Jordan, the Philippines and Thailand were surveyed in 1966 by AID and Battelle officials, prior to the pump development program, to ascertain requirements for design improvements.

FEI Graduates Honored at White House Ceremonies

President Richard M. Nixon congratulated Manfred Gale of the U.S. Army Mobility Equipment Research and Development Center (MERDC) at Fort Belvoir, Va., and other federal executives honored at a recent White House ceremony upon graduating from the Federal Executive Institute.

Established by direction of the President, the FEI serves as an advanced study center for upper-echelon federal executives. As an interagency of the U.S. Government, the FEI is administered by the U.S. Civil Service Commission in collaboration with the University of Virginia at Charlottesville.

Gale is acting associate technical director of the MERDC and former chief of the Intrusion Detection and Sensor Laboratory. Recognized as an authority on mine detectors and sensing devices, he was one of 60 individuals from 30 different departments and agencies of the government nominated to attend the institute.



Manfred Gale

A 1949 graduate of the University of Virginia with a BS degree in electrical engineering, Gale has been associated with the MERDC and its predecessors since 1950. He has earned a number of awards, including the Meritorious Civilian Service Award, for his work in the detector-sensing field.

A combat veteran of World War II, he is a member of the Institute of Radio Engineers and Toastmasters International, and is listed in *Who's Who in the South.*

Wollstadt Takes DoD Post as Deputy ASD (M&RA)

Appointment of Paul Wollstadt as Deputy Assistant Secretary of Defense (Manpower and Reserve Affairs) was announced effective in July, when he left a position as senior vice president of Mobile Oil Corp.

Wolstadt will work under Deputy Assistant Secretary of Defense (Manpower and Reserve Affairs) Roger T. Kelley, with responsibility for operations of the Directorate for Procurement Policy and General Research. He also is concerned with operations of the Directorate for Manpower Utilization and Management Techniques.

In addition to working with the Office of the Secretary of Defense and the Military Departments in determining manpower support requirements, including recruiting and selection procedures, he will direct research to assure more effective utilization of military and civilian personnel.

Wollstadt was graduated from the University of Illinois with an AB degree in 1932.



Paul Wollstadt

WES Research Indicates Redesign of Wheel Merits Serious Effort

One of the popular quips in R&D circles for a long time, that one about "redesigning the wheel" in referring to fruitless duplication of basic research effort, is not so far-fetched, a recent report indicates.

Supported by funding under the U.S. Army In-house Laboratory Independent Research (ILIR) Program, Dr. Klaus W. Wiendieck has produced impressive test findings to support a theory that wheel design for specific military and civilian applications may be the answer to problems.

Since the beginning of man's search for mobility by means other than those endowed by his creator, the general scientific assumption has been that, like Gertrude Stein's "A rose is a rose is a rose," a wheel is a wheel —round and not subject to any more efficient configuration.

WES Technical Report M–69–2, "Improved Wheel Performance on Sand by Controlled Circumferential Rigidity," is a 64-page document containing many diagrams and formulas to show precisely how wheel performance is determined ultimately by the stresses at the soil-tire interface.

Objective of the research program was to ascertain if this observed phenomenon could be used advantageously in off-road mobility research that is, if control of the interface rigidity pattern could permit a favorable influence on the stress distribution and resultant increase in performance of the wheel.

In conceiving this project, Dr. Wiendieck, a German scientist assigned to the Mobility Research Branch (MRB), Mobility and Environmental Division, U.S. Army Waterways Experiment Station (WES), Vicksburg, Miss., developed a rather complex mechanism to control the angle of stress in an experimental rubber-tired wheel.

Constructed under contract with WNRE, Inc., Chestertown, Md., the wheel was fabricated only to test and verify Dr. Wiendieck's hypothesis. Stressed in the report is that the wheel is "highly impractical and inefficient in itself" and is *not to be used* "as a practical means of locomotion."

Pointed out, however, is that "since only very slight rigidity variations are needed to obtain the highest performance, the prospect of applying the principle of controlled rigidity in practice seems promising."

Order of magnitude of the measured performance variations and the observed trends are explained theoretically in the report, supported by theoretical computations based on variations of assumed soil reaction pressure distribution as a function of the interface of rigidity pattern.

Explained in the introduction is: "Theoretical prediction of how variations of tire properties influence the wheel performance are impossible at the present state-of-the-art, since the physical insight into the mechanism of soil-wheel interaction is rather rudimentary . . . Therefore, the soft-soil mobility research with tires has been essentially empirical.

"Little is yet known about the tangential stress, which is less easily determined; but the tangential stress distribution likely experiences equally drastic changes when the inflation pressure is decreased.

"The decrease of inflation pressure thus constitutes a severe interference with the soil-wheel interaction, the results of which are unforeseeable at present by theoretical means."

Experiments were performed in the WES laboratories and involved four groups of tests: with favorable rigidity distribution; with unfavorable rigidity distribution; with neutral rigidity distribution; comparison tests [of the special rubber tire on the test wheel] with conventional tires.

Comparison with conventional tire results was inconclusive because rigidity of conventional tires could not be controlled adequately. Wheels with more favorable stress distribution, however, not only developed more pull (maximum 13 percent) over the entire range of conditions tested, but did so with "greater efficiency."

The ILIR report on Dr. Wiendieck's investigations, as required by ILIR Program policies for this effort sponsored by the Assistant Secretary of the Army for Research and Development, states in part:

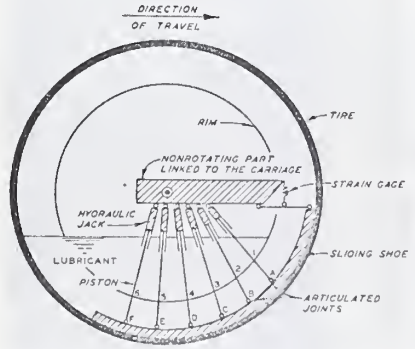
"The principle was clearly demonstrated that wheel performance can be controlled by controlling the transmission of locomotion forces to the supporting soil. The direction and magnitude of control and the degree of improvement were also established.

"It is probable that Dr. Wiendieck not only accomplished his mission, but also opened the door to design of a better wheel."

Army mobility expert W. J. Turnbull, former WES technical director for Soils and Environmental Engineering, was among those who participated in general supervision of Dr. Wiendieck's experimental program. Direct supervision was assigned to Dr. D. R. Freitag, chief, MRB Div.

Others who contributed to the program include W. J. Shockley and S. J. Knight, chief and assistant chief, respectively, of the Mobility and Environmental Division.

During the extended period of the study (1966-68), Col John R. Oswalt Jr. was succeeded by Col Levi A. Brown, current WES director, and J. B. Tiffany gave way to F. R. Brown as technical director.





SCHEMATIC and internal view of experimental wheel.

HEL Assigned Manpower Tasks

Assignment of an additional mission requirement to the U.S. Army Human Engineering Laboratories (HEL) at the Aberdeen (Md.) Research and Development Center was announced recently by Dr. John D. Weisz.

The HEL director said the U.S. Army Materiel Command has designated HEL as the field coordinating agency responsible for assuring complete integration of manpower characteristics. Included are personnel skills, training implications, behavioral reactions, human performance, anthropometric data and biomedical factors.

HEL's new task involves establishment and operation of a manpower characteristic data bank responsive to the Army Materiel Command's changing materiel development needs.

Dr. Weisz said this will necessitate use of modern storage and retrieval equipment, and establishment of procedures to assemble, store and disseminate data to all Army development agencies and their contractors.

HEL Researcher 'Digs' Dangers of 'Hard Rock' Music

Music of the "hard rock" variety and the noisy blast of weapons, as experienced by tank crews in combat, may not on first consideration appear to have much in common—but either may cause loss of hearing.

Authority for that viewpoint, based on a recent study, is George R. Garinther, a research engineer with the Acoustical Branch of the U.S. Army Human Engineering Laboratories, Aberdeen (Md.) Proving Ground.

In his normal work at the laboratories, Garinther is concerned with methods of providing adequate protection to minimize the hazard of men in combat being exposed to noise levels that may cause either temporary or permanent impairment of hearing.

The research he conducted on sound intensity of hard rock music, however, was performed as part of a professional community service. "This type of music," he commented, could "create a generation of youngsters who are hard of hearing."

Using a sound-level meter and recording equipment attached to a microphone in the center of a hard rock band playing at a club in Aberdeen, Garinther recorded an over-all average sound pressure level of 112 decibels. Much of the energy was concentrated at a high frequency of 2,000 cycles per second, he learned.

Garinther said the sound pressure levels recorded in his study are sufficient to cause a 45-decibel loss of hearing if exposure is continued over a period of years. However, the equipment was not set up where the sound would be loudest—at which point, he said, the band should play only 15 minutes every 24 hours.

Anyone sustaining a 45-decibel loss of hearing, he said, would have difficulty understanding speech. Army tank personnel are not exposed to such a loud noise, he added. "If a vehicle were found to be hazardous to hearing, the Army would correct it."

Hard rock music groups, he recommends, should, if they must, maintain the bass noise but decrease the high-frequency sound, since "the treble sounds overload the ear where it is most sensitive to hearing loss."

In comparison with noise levels of some hard rock bands, as published recently in national journals, Garinther commented that the band he tested was "relatively more quiet." With volume controls ranging from 0 to 10, the test band used the 3 level.

The band was reluctant to participate in the study and agreed to the test only after being assured no names would be used. Garinther said "one 15-year-old told me he could hear in one ear, and hoped his mother wouldn't find out."

Both bandsmen and listeners could benefit from the use of ear plugs, the researcher said. "With standard Army plugs, this group could play eight hours a day, seven days a week without hearing damage."

JILA Picks NBS Scientist As Branscomb Moves Up

Dr. Peter L. Bender, a National Bureau of Standards (NBS) physicist, was recently elected chairman of the Joint Institute for Laboratory Astrophysics (JILA), succeeding Dr. Lewis M. Branscomb, appointed by President Nixon as the sixth director of the NBS.

Widely known for his work on the use of lasers for precise measurement and for his studies of fundamental constants of matter, Dr. Bender is a senior staff member of the NBS Laboratory Astrophysics Division and is also adjoint professor in the University of Colorado Department of Physics and Astrophysics.

JILA was established in 1962 as a collaborative effort of the University of Colorado and the National Bureau of Standards to stimulate laboratory and theoretical research and graduate-level training in physical processes of astrophysical importance.

Walker Succeeds Ray as Picatinny Commander

Picatinny Arsenal's new commander is Col William A. Walker Jr., until recently an Army military representative in the Office of the Assistant to the Secretary of Defense for Atomic Energy, Washington, D.C.

Prior to an assignment as a staff officer in the Nuclear, Chemical and Biological Division, Office of the Chief of Research and Development, HQ DA, from August 1964 to July 1965, he served in Korea as commander of the 83d Ordnance Battalion.



Col William A. Walker Jr.

Other key assignments have included a tour at the Aberdeen (Md.) Proving Ground, with the Office of Special Weapons Developments at Fort Bliss, Tex., and staff officer in the Office of the Assistant Chief of Staff for Force Development, Washington, D.C.

Col Walker was graduated from the United States Military Academy in 1945 and received a master of science degree in physics from the University of Virginia in 1950. He has completed the Infantry Officers' Advanced Course, the Command and General Staff College course, and graduated from the Army War College in 1966.

Following graduation from the USMA, he served nine years as an Infantry officer until transferred to the Ordnance Corps in 1954.

Picatinny Arsenal Promotes Painter to Technical Director

Promotion to technical director of research and development activities at Picatinny Arsenal recently capped a decade of progressively responsible assignments for Harry W. Painter.

For the past two years he has served as deputy director, Nuclear Engineering Directorate. His new responsibilities make him the principal adviser and assistant to the arsenal commander for research, design, development, production, processing, maintenance engineering and quality assurance, as well as for scientific studies and long-range plans.

Painter also is chairman of the Picatinny Arsenal Technical Board, which has broad responsibilities in the management of the scientific and technical resources.

Graduated from Newark (N.J.) College of Engineering with BS and MS degrees, he has done graduate work at Stevens Institute of Technology. He is a member of the Scientific Research Society of America and the American Ordnance Association.



Harry W. Painter.



MERITORIOUS SERVICE. Outstanding contributions of *Donald J. Looft* to Army and Defense electrical power programs recently were recognized by award of the Meritorious Civilian Service Medal (MCSA) at the Army Mobility Equipment Research and Development Center (MERDC), Fort Belvoir, Va.

Looft was cited for "effective direction of broad and high priority research and development at the Center, plus his extraordinary ability to enlist top level government and industrial support for dramatically advanced concepts."

Looft received the award at a ceremony climaxing his nearly 24 years of military-civilian service at Fort Belvoir. Beginning in 1945 as a lieutenant, he became a civilian employe after World War II and advanced in various key positions until he became acting technical director, MERDC's highest civilian position, in the spring of 1968 and served almost a year. He is now associate director for engineering of the Night Vision Laboratory, a field agency of the U.S. Army Electronics Command, located at the MERDC.

Miss Anne M. Kunkel received the MCSA for planning and execution of scientific research and meticulous performance of experimental applications of pharmacology to chemical defense at Edgewood Arsenal, Md.

"During the period of July 1967 through Mar. 1, 1969," the citation states, "Miss Kunkel accomplished her research duties in an exemplary manner, making unique and distinctive contributions and setting a record of achievement as well as serving as an inspiration to her colleagues."

In addition to her important responsibilities in laboratory research, which have resulted in publication of more than 30 reports and papers in scientific journals and Army publications, she has served as acting chief of the Pharmacology Branch.

LEGION OF MERIT.*Col Elbridge L. Snapp*, assistant to the deputy CG of the U.S. Army Materiel Command (AMC), received the LOM for "varied knowledge of logistical matters displayed with the highest level of managerial talent in sifting peripheral material and in perceiving the underlying problems."

BRONZE STAR. Maj Gen John Norton, CG of the U.S. Army Aviation Systems Command (AVSCOM), St. Louis, Mo., recently presented *Lt Col Charles E. Nickolls*, special project officer to the deputy CG for Logistics, the First Oak Leaf Cluster to the Bronze Star Medal.

He was cited for distinguished service as senior staff technical representative, AVSCOM, attached to the U.S. Army Customer Service Office in Vietnam, where he ensured "optimum logistical support to all major aviation units and, consequently, was instrumental in the discriminative reallocation of critical repair parts and replacement aircraft."

Maj Ulysses S. Large, deputy secretary of the General Staff at HQ AVSCOM, received the BSM for service in Vietnam from August 1968 to February 1969. The citation states:

"During this period he rendered invaluable assistance to commanders and their staffs in expediting critical supply items and resolving logistical problems involving all aviation units in the country."

Maj Charles J. Vincent received the second Oak Leaf Cluster to the Bronze Star Medal for meritorious service in Vietnam from September 1968 to February 1969. Maj Vincent is now an R&D coordinator in the Plans and Operations Office, MERDC.

MERITORIOUS SERVICE. Edgewood (Md.) Arsenal's first award of tthe newly authorized Meritoriou Service Medal (MSM) to *Lt Col John M. Longstreet* recognized him for service as chief of the Plans, Readiness and Operations Office.

He was commended for management of the RDT&E, procurement and production, engineering and planning programs covering the life cycle of chemical weapons and defense material for Department of Defense chemical programs.

Maj George D. Iverson V, was presented the MSM for service in the Office of the Chief of Research and Development (OCRD) from October 1967 to June 1969, when he was released from active duty.

As a staff officer in the Air Mobility Division, Maj Iverson was responsible for monitorship of the heavy-lift helicopter program and aircraft engine developments.

The U.S. Army Combat Developments Command, Fort Belvoir, Va., awarded its first MSM to *Maj Monica Ann Heffren*, the first member of the Women's Army Corps (WAC) to receive the award.

Maj Heffren was commended for her efforts and contributions in assuring accountability for more than

Lt Col Rorke Wins Creative Thinking Award at C&GSC

Creative Thinking Award winner for the 1968-69 class of the U.S. Army Command and General Staff College, Lt Col Donald M. Rorke, was honored at graduation ceremonies.

C&GSC Commandant Maj Gen John H. Hay Jr. presented Col Rorke with an engraved miniature of Rodin's statue, "The Thinker," and $100 in cash.

Originated by the U.S. Army Combat Developments Command, the Creative Thinking Award gives recognition to the student officer at the C&GSC, or career courses at branch and service schools, who submits the best paper concerning doctrine, organization or materiel.

Entries in the competition were evaluated by the CDC Institute of Combined Arms and Support, Fort Leavenworth, Kans. Col Rorke's paper, "A Miracle in the Barracks: A Living Environment for Enlisted Personnel in the U.S. Army," envisions a modular system of storage, sleeping and accessory equipment compactly packed for use in an Army barracks.

Potential for Army application, creativity and imagination are among the criteria for the CDC Creative Thinking Award. The suggested idea may be related to the Army of today or the Army of the future.

Backed by 15 years of service as an Army officer, Col Rorke was CO of the 2d Battalion, U.S. Army Security Agency Training Regiment, Fort Devens, Mass., until he entered the C&GSC. He has BS and MS degrees in industrial design from Syracuse University.



C&GSC Commandant Maj Gen John H. Hay Jr. presents "The Thinker" award to Lt Col Donald M. Rorke. In background is Col Clarence E. Lawing, secretary/class director of C&GSC.

6,000 controlled documents.

AIR MEDAL. The 16th through 18th Oak Leaf Clusters to the Air Medal were awarded to *Maj Emilio B. Zamora* for participation in more than 75 aerial missions in support of combat ground forces in the Republic of Vietnam. Maj Zamora is now serving with the Plans Division, OCRD.

JOINT SERVICE MEDAL. Lt Col Warren C. STone, Programs and Budget Division, OCRD, was awarded the Joint Service Commendation Medal for outstanding performance as comptroller of Project Cloud Gap and comptroller-financial manager Field Test-15, Exercise First Look, during the period June 20, 1967 to Feb. 28, 1969.

COMMENDATION MEDAL. *Lt Col George H. Gardes,* now with the Management and Evaluation Division, OCRD, received the first Oak Leaf Cluster to the ARCOM for meritorious achievement while serving as a member of the Department of the Army M16 Rifle Review Panel, Office of the Chief of Staff, U.S. Army.

Capt Larry D. Warren received the ARCOM (first Oak Leaf Cluster) for service from Nov. 1967 to May 1969 as acting safety officer for the U.S. Army Engineer Reactors Group at Fort Belvoir, Va., and as acting special assistant for health and safety for the Nuclear Power Division of the Office of the Chief of Engineers.

COMMENDATION CERTIFICATES. Dr. Richard A. Weiss, Deputy and Scientific Director, U.S. Army Research Office, presented Army Certificates of Achievement, Outstanding Performance Awards, and Quality Salary Increases to Army Research Office personnel July 17.

Certificates of Achievement were presented to *Mrs. Harriet B. Doyle,* Research Programs Office, and *Mrs. Cecelia M. McParland,* Environmental Sciences Division.

Outstanding Performance Ratings and Quality Salary Increases were presented to *Mrs. Cora F. Watson,* Office of the Deputy and Scientific Director; *Mrs. Maria R. Murphy,* Physical and Engineering Sciences Division; and *Mrs. Mary E. Miller,* Systems and Operations Branch, Management Information Division.

Mrs. Mary E. Duehring, Studies and Analyses Division, and *Mrs. Anne R. Walker,* Environmental Sciences Division, received Outstanding and Sustained Superior Performance Awards.

Outstanding Performance Awards also recognized *Dr. James I. Bryant,* Physical and Engineering Sciences Division; *Mrs. Jean F. Greene,* Environmental Sciences Division, and *Mrs. Jo Ann Cupp,* Life Sciences Division.

DDC Administrator Cited for Exceptional Service



Dr. Robert B. Stegmaier Jr.

Dr. Robert B. Stegmaier Jr., administrator of the Defense Documentation Center, was cited recently by the director of the Defense Supply Agency when he was presented the Exceptional Civilian Service Award.

The citation reads, in part, "For exemplary performance of duty as administrator of the Defense Documentation Center from November 1963 to April 1969. With an exceptional degree of professional ability, Dr. Stegmaier directed the development of the Documentation Center into an extremely effective organization devoted to the service of the research and development community."

Dr. Stegmaier was born at Cumberland, Md., and raised in Baltimore, where he was graduated from Johns Hopkins University in 1938 with a BS degree in civil engineering, MS degree (1940) and PhD (1942).

During World War II, he served with the Army Corps of Engineers, having been called to active duty two days prior to the attack on Pearl Harbor. After the war he served in a number of research and development positions in the Office of the Secretary of Defense. From January to June 1962, he was a member of the task force appointed by the President's Special Assistant for Science and Technology to study the problems of scientific and technical communication in the U.S. Government. Prior to assuming his current duties, he was staff assistant to the Director of Technical Information for the Department of Defense.

Illinois University Confers Honorary Degree on Hamrick

In recognition of distinguished service to the field of visual science, Brig Gen William A. Hamrick, chief of the Army Medical Service Corps since 1963, was recently awarded an honorary doctor of science degree by the Illinois College of Optometry.

Almost simultaneous with the award of this degree was the announcement of the American Optometric Association of his selection for honorary membership—a distinction that has been conferred on only two other recipients since the association was formed 72 years ago.

As chief of the Medical Service Corps, General Hamrick directs nearly 6,000 Army MSC officers, including 303 optometry officers, serving throughout the world. In Vietnam, MSC officers serve in such diverse activities as optometry, hospital administration, laboratory research, sanitary engineering, aeromedical evacuation, command and staff roles.



Brig Gen William A. Hamrick

General Hamrick has a BS degree in business administration from Oklahoma A&M University and two master's degrees, in public administration from American University in Washington, D.C., and in hospital administration from Baylor University in Waco, Tex.

Harvard's JFK School Picks MICOM Employe as Student

Notification of selection for a year of graduate study at the John F. Kennedy School of Government at Harvard University, came recently to Robert J. Spazzarini, a member of the Adversary Proceedings Division, Chief Counsel's Office, HQ U.S. Army Missile Command, Redstone Arsenal, Ala.

Maj Gen Charles W. Eifler, CG of MICOM, presented Spazzarini with a career education award from the National Institute of Public Affairs. These awards are given annually to career men and women in public service who have potential for high-level policy and management positions. Each person selects a study program tailored to his job needs.

Spazzarini has been employed at Redstone since April 1966.

Trends in Vehicle Interconnecting Wiring Systems

By Marquis W. Woody

Interconnecting wiring systems are becoming more complex in Army ground combat vehicles due to more demanding operational requirements, including greater reliability and improved maintainability in conjunction with reduced weight and volume for each vehicle system.

The addition of the Shillelagh Guided Missile System on the M60A1E2 combat ground vehicle, for example, has increased the number of electrical connections from 150 to about 1,400. Major systems, such as the missile and turret gun and cupola control, require interconnecting cabling within these systems and to the vehicle electrical system. Interconnecting boxes and additional automotive functions add to circuit complexity.

Army tactical and combat ground vehicles are using a waterproof interconnecting wiring system introduced during the years 1948–50. A typical modular harness assembly of this design is shown in Figure 1. The fabrication procedure consisted of laying out the harness configuration on a jigboard, cutting and fitting wires with turns and breakouts laid over guide posts, taping, and then adding connectors and terminals.

Recent vehicle developments have demanded the miniaturization of many elements of the interconnecting wiring system, with attendant fabrication problems.

In an attempt to offset this trend toward increasing complexity, the development of an optimized interconnecting wiring system applicable to all Army ground vehicles has been pursued by contract and in-house research at the U.S. Army Tank-Automotive Command.

This effort began with a broad investigation of deficiencies in present systems, the needs of future systems, and the methods and materials by which these deficiencies can be corrected. A cost analysis was conducted to determine the economic feasibility of applying new methodology and materials.

During the investigation, engineers catalogued the major problems or deficiencies in present harness systems, based on interviews with persons associated with the design, fabrication, installation, use and maintenance of vehicle electrical harnesses.

Deficiencies reported included deterioration of wire insulation; oversized electrical conductors required for mechanical strength; high cost and difficulties incurred in harness wrapping; troubles in manufacturing and troubleshooting splice circuits in harness bundles; high cost in repairing molded splice coverings and wire breakouts.

Additional deficiencies were lack of test points with which to make electrical tests on an energized system; quality control difficulties with solder connector contacts; lack of adequate engineering efforts in harness system design-prototype systems that become frozen into final design; harness locations providing minimum accessability to connectors and inadequate protection from oil and moisture.

Detailed system requirements were prepared, based on results of the engineering study and the fabrication of a breadboard model of the system. The program was then concluded with the fabrication of eight complete systems, using harness concepts developed during the engineering phase, and the preparation of a drawing for guidance in vehicle system design.

The vehicle system selected for use in evaluating the research program concepts was the M113A1 armored personnel carrier. This has an advanced wiring system with five salient features:

- It has a totally enclosed instrument panel as a central focus of the electrical system, with the degree of sealing dependent upon individual ve-



Marquis W. Woody is an electrical engineer in the U.S. Army Tank-Automotive Command's Vehicular Components and Materials Laboratory, working in the areas of inter-connecting wiring systems, slip rings and high-voltage power supplies. Woody attended West Virginia State College and received a BS degree in industrial engineering in 1949. In 1954, he earned a BS degree in electrical engineering from Lawrence Institute of Technology in Detroit. Woody came to USATACOM as a civilian employee in 1952.

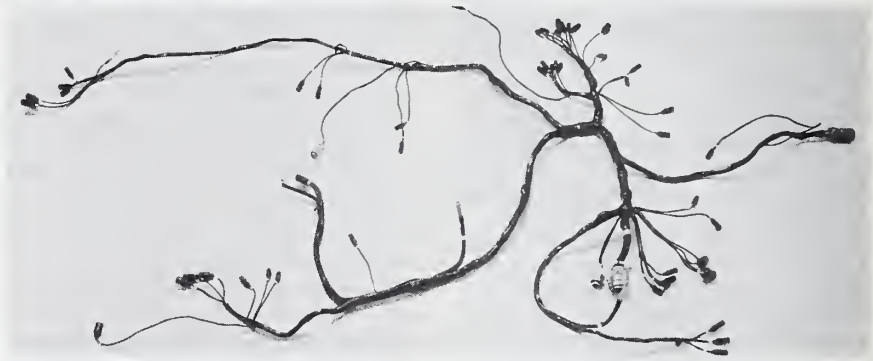


Fig. 1. Typical Modular Harness Assembly.

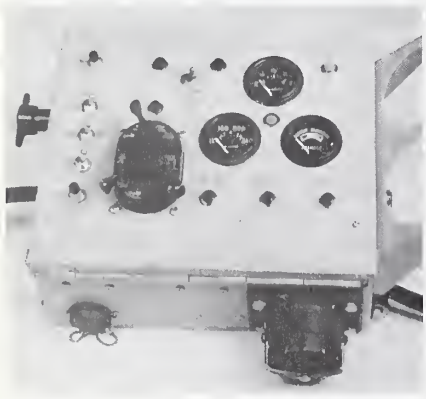


Fig. 2a. Instrument Panel (exterior).

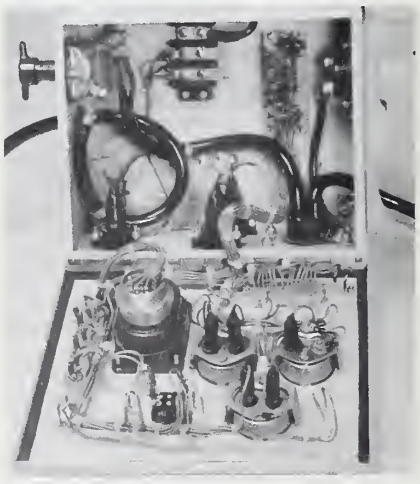


Fig. 2b. Instrument Panel (interior).

hicle requirements (Figure 2). This panel combines the function box. The mechanically driven speedometer and tachometer are attached externally.

• Circuitry emanates from the instrument panel, either in bundle, single-conductor harnesses secured with nylon ties, or in multiconductor, jacketed cable. Polyalkene insulation, vinylidene fluoride jacket, (Mil W-81044), is used for the small-size wires (14, 16 and 18 American wire gauge) in single and multiconductor cable applications. The jacket of the multiconductor cable is constructed from the same material. For the large-size wires (0 and 4 AWG), .048-inch black polyurethane insulation is used.

• Local junction boxes are used for distribution of circuits and splices are eliminated by the use of local junction boxes or parallel conductors.

• Direct entry of cables or harnesses into enclosures through grommets or stuffing tubes minimizes the need for connectors.

This interconnecting wiring system has many advantages over that now in use. It elminates most of the deficiencies cited in present systems. The enclosed instrument panel does present a problem of condensation accumulation, which plagued wiring systems before the development of the present open-back panel with waterproof components and wiring. However, USATACOM engineers are pursuing a solution to this problem.

The prototype interconnecting wiring system has indicated one method of shifting costs from fabrication and installation to materials. Moreover, it has shown how a potential installation cost reduction of approximately 20 percent can be obtained as compared to the present M113 harness.

The progressive development of new materials and processing techniques is having a considerable impact on the Army research program, far beyond the scope of current project efforts.

For example, the requirement for one type of single-conductor cable (M13486/11-5) has been modified to permit an optional construction. This embodies the concept of replacing present threefold extrusion of insulation, glass braid and polychloroprene jacket with a single-extrusion of chlorosulfonated polyethylene.

Use of this technique should increase production capacity by 75 percent. The development was pursued in lieu of other proposed concepts, such as a reduction of the number of conductor strands and an increase in the diameter of the remaining strands to maintain the same conductor current rating.

This program of optional cable construction was initiated in 1966, when the production rate of cable was a major concern relative to Army vehicle production schedules. Consideration is also being given to future development of this type of construction with an outside diameter compatible with the grommet holes for the military standard connectors.

Expansion of the polycarbonate (plastic) military line of products has recently encompassed the concept of replacing the present aluminum shell components of the "Ordnance Series" of electrical connectors with this material.

Present aluminum shells have a cadmium-plated finish and a clear chromate after-treatment. This finish is electrically conductive and resistant to corrosion. The projected reduced costs associated with polycarbonate connectors will warrant USATACOM's research attention.

The future of interconnecting wiring systems will be closely allied with possible usage of higher-voltage systems, alternating-current systems and sensitive electronic circuitry requiring extensive shielding.

Activities to be pursued include the use of digitial signals and logic-to-control multiple circuits through a single wire, and the use of thin-film deposition of circuit elements, whereby circuits and interconnecting lengths may be deposited directly on the vehicle structure.

Laird Gives AFSC Graduates Views on Leadership

Secretary of Defense Melvin R. Laird, in addressing the graduating class of the Armed Forces Staff College at Norfolk, Va., June 27, said:

" . . . Once it was enough that the military leader excel in strength and courage. Today, the range of talents required is infinitely broader, and the emphasis is on brainpower and character. Let me give some examples of the type of talents now in demand.

"We need military leaders who understand this complex world in which we live, the philosophies men live by, the leaders and people of other nations, their history, their customs, their aspirations, their problems.

"We need military leaders who understand the scientific revolution of recent years, the physics and mathematics and other sciences that have given us the power to relieve human misery or to destroy each other.

"We need military leaders who understand the techniques of managing bafflingly complex organizations. But no intellectual brilliance and no technical capacity will be enough to qualify one for military leadership unless it is combined with qualities of character that inspire other men to give forth their best effort in common cause. . . ."

USAEPG Tests 2-Way Radio for Crewmen Emergencies

Testing of a small 2-way radio designed to provide voice communication for 10 miles between aircraft crewmen in an emergency situation and potential rescuers is under way at the U.S. Army Electronic Proving Ground (USAEPG), Fort Huachuca, Ariz.

The model is a substantially improved version of a unit tested in 1966 that had neither 2-way communication nor ultra-high-frequency.

The new AN/URC-68 Emergency Personnel Rescue Radio Set is intended as part of an aircrewman's survival kit, attached to the parachute in the ejection equipment. When the airman is ejected and his parachute opens, the antenna automatically extends and the beacon transmits homing signals.

Testing will include environmental, human factors, electromagnetic compatibility, reliability and safety considerations. Environmental testing will include water immersion, rain, humidity, blowing dust, salt fog, fungus, vibration and impact shock up to 30 Gs.

The test unit was developed in the Avionics Laboratry, HQ U.S. Army Electronics Command, Fort Monmouth, N.J.



S/Sgt Eugene Murray displays Emergency Personnel Rescue Radio Set being tested at Electronic Proving Ground, Fort Huachuca, Ariz.

Guide Details Preparation of Operations Research Study Proposals

The following is a condensation of a new pamphlet, "A Guide for Preparation of Operations Research Study Proposals," being distributed to interested Army agencies. Prepared under the direction of Col McGovern as chief of the Studies and Analysis Division, Army Research Office, the guide is available from this agency. Col McGovern is now in Baumholder, Germany, as commander of the 2d Brigade, 8th Infantry Division, Seventh U.S. Army.

By Col Russell D. McGovern

Often the most critical stage of an operations research study is the preparation of the proposal stating its objectives, order of procedures, and how results are to be used. Development of a study requirement is really little different from formulating the purpose of a staff study or the mission of an operations plan.

Still it is amazing how many people pay little notice to this important step. Many studies have gone from conception to conclusion with the sponsor lacking a clear idea of the purpose of his study. Preparation of the work statement requires a comprehensive evaluation of all the essential elements of the study.

Study progress generally follows the stages of the classical scientific process, with each phase contributing to the solution of the problem. The formal sequence of the scientific method provides an outline of successive events to solve problems.

Dr. E. S. Quade of the RAND Corp. has adapted the scientific method to operations research. He defines the sequence in four phases: Formulation, where objectives and scope of the problem are stated; Search, wherein relevant data and assumptions are gathered or generated; Explanation, where the various elements of the problem are assessed through use of analytic techniques; and Interpretation, where solutions obtained from the model are examined and various trade-offs of elements are evaluated.

Unlike a pure scientific experiment, results of an operations research study are seldom verified. Adaption of Dr. Quade's scientific method, while generally defining the process, also provides a checklist of the many important elements that need recognition before an operations research study is initiated. The author of the study proposal must think through these steps and consider the essential elements of each.

Backward planning, odd as it may seem, is the most effective method for thinking through an operations research study proposal. The most critical phase of the study plan is to determine exactly what use will be made of the final results. If this question cannot be answered adequately, the study will lack proper guidance; the plan will not have a clear-cut goal.

Adequate description of the problem shapes the nature of the alternatives that the decision-maker will eventually consider. The end product of the study must be visualized adequately before a work statement is prepared.

For example, suppose that a new man-portable tactical air-defense missile must be introduced into the field army in the next three to five years to counter a predicted threat. One of three existing prototype missiles for production and introduction into the field must be selected within a year.

In preparation for action in this situation, we consider our problem in detail in conjunction with the objective of our study proposal, "Analysis of Missiles A, B and C for the Tactical Air Defense Role in 1972 to 1974." Objectively, the end product would provide the decision-maker with comparison of these missiles.

If the study is to serve as a useful decision tool, the alternative courses of action must be presented in a manner that permits parallel comparisons while stressing the unique advantages and disadvantages of each. The strengths or weaknesses of the alternatives will be reflected in the parameters addressed in the analysis.

Parameters are variables that are given constant values during a calculation. Each parameter represents a critical related factor under consideration and must be relevant and sufficient to include all the factors impinging on the considerations at hand while eliminating insignificant ones. Parameter designation and evaluation will be a joint venture of the military and the analysts who do the work.

When study results provide a design for a new system, full instructions to all potential users, as well as a description of the system citing inherent advantages or disadvantages, are essential parts of the study product. Documentation may consist of computer software such as programs and computer related accesories with necessary instructions for implementation. An in-house agency must be designated beforehand to train personnel and make the system operational at the end of the study.

Alternative courses of action depend upon the parametric evaluation of critically related facts and realistic assumptions provided by the military. Hard facts are provided and assigned values by military judgment, using available data such as those related to system performance, technological aspects, or environmental conditions.

Where facts and assumptions are variable, their range of values must be established and agreed upon by the military and the analyst, considering system requirements and analytical capabilities. The author should consider what facts and assumptions will be needed and which are available.

Necessarily, the author will become something of an expert in related work or studies that will impinge on his problem. Numerous sources of information are available to him to relate his problem to past and ongoing studies.

Agencies such as the Army Study Documentation and Information Retrieval System (ASDIRS), Defense Documentation Center (DDC), Defense Logistics Studies Information Exchange (DELSIE), and Army Research and Development Information System (ARDIS), can help the author gather facts about his subject area.

Answers to critical questions relating to the problem will establish alternative courses of action. It is important that the author try to visualize the nature of these questions because study findings will center on providing answers. Some questions can be answered by a literature search of related studies.

During the course of the study, answers to many questions will be obtained by analytic techniques, resulting in a summary and analysis of facts and assumptions. In considering these, the analyst makes his major contribution to the study.

Important questions will be answswered properly only if the author of the proposal knows the methods for obtaining answers and the need for weighted answers in support of alternative courses of action. Analytic techniques will frequently involve mathematical models wherein parameters are assigned weights and placed into simple equations. The equations will be quantitative representations expressing relative importance of parameters and conditional constraints upon them.

Several operations research techniques may be used to determine the final measure of effectiveness, as well as suboptimization. Linear programing can establish optimum distribution within associated cost restraints.

Using computer simulation, parameter values can be varied within specified boundaries to derive a range of results. Analytical expressions also serve in applicable situations. Gaming theory examines the range of possible position and determines the most favorable.

Because all questions cannot be addressed in a single operation, work should be divided into tasks, each considered as a substudy part of the whole. Tasks will be interrelated and often interdependent; relationships will dictate the sequence in which they are to be performed. One could visualize these tasks arranged in a flow diagram depicting sequences in which they will occur and the interrelationships among them.

With the tasks defined, the major study objective can be clearly stated, directing attention to the desired end product. The statement of the problem objective and the tasks needed to achieve the final product are depicted in Figure 1.

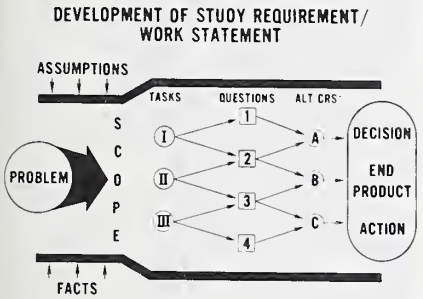


Figure 1

The author should now be able to trace his study plan, from the statement of objective through tasks that address critical questions, and assess alternatives for the decision-maker in a logically developed sequence.

In every study proposal, limitations must be considered to guide the judgment of military sponsors and analysts throughout the study process. The limitations are defined in the Scope, Scenario and Criteria.

The Scope of the study provides necessary constraints to place facts and assumptions within manageable limits. Limitations involve such factors as time periods, geographic areas, population descriptors, environmental conditions, or systems performance—all falling properly within the stated scope of the problem.

The Scenario may also be an essential part of the study to set the stage for visualizing a future operation. It should provide a description and outline the operation of such items as threat, force structure, logistics, capabilities and limitations of weapons systems, and time-phasing of troop strength. The Scenario, like the Scope, provides the analyst with guidelines and clearly defines limits within which important elements are to be considered in the study.

Establishment of Criteria is often overlooked, though essential to set performance standards on which judgments may be based. A criterion may also be a statement of preference of one characteristic over another, and this may be used to select preferred alternatives. A criterion might be the speed of the vehicle, trafficability of the soil, requirements for unit performance, cost, or the degree of existence of almost any factor considered in the study.

Like the Scope and the Scenario, Criteria will offer guidance to the analyst for assigning weights to parameters to be addressed in his analysis. Criteria will be included in data, facts and assumptions the military provides.

At this stage of thinking through the study proposal, the author should have a rather clear understanding of what is wanted, what needs to be done, and the limitations to be considered while making the evaluations of required data, facts and assumptions.

With his plan clearly in mind, the author's next step is to call on his chief and make sure that his plan will provide the desired information. An action officer may inadvertently prepare a proposal in the prescribed format that fails to define the desires of the chief. If requirenents are vague, one must have the courage to go back to the chief to have them clarified.

When the author has thoroughly prepared, the study proposal or work requirement, request for contract service is submitted for approval in accordance with Appendix A, AR 1–110, clearly depicting what is to be done and what product is expected.

Descriptions of objectives must provide adequate guidance for the contracting officer or approval authority. A potential contractor needs to know the depth of the work to determine the skills required, the time for completion, and the approximate cost involved. In defining the work to be done, it is better to be over-specific rather than too general.

In conjunction with submitting the request for contract and completion of the work statement, a management plan for supervising the project is prepared. This plan describes the steps required to initiate, coordinate and supervise the study from its inception to completion, taking into consideration the major objectives and tasks of the study and how they are to be coordinated.

The plan provides a milestone schedule depicting the phases and related tasks of the study and the critical points where supervision or input is needed. It prescribes the sequence for in-process reviews and the goals and methods for conducting them. It sets up a schedule for providing information to the analyst in a complete and timely manner.

In summary, it must be re-emphasized that a study will be only as effective as are its supporting direction and guidance. The study proposal must be based on a clear understanding of the use to be made of results. All efforts in proposal preparation and study management must be directed to maximum utilization.

Laird Announces Selection Of Pranger as Deputy ASD

Appointment of Dr. Robert J. Pranger as Deputy Assistant Secretary of Defense for Near East and South Asian Affairs was announced recently by Secretary of Defense Melvin Laird.

Assigned to the staff of Assistant Secretary of Defense (International Security Affairs) G. Warren Nutter, Dr. Pranger is responsible for all policy matters of Department of Defense interest pertaining to the Near East and South Asian Region, including Greece and Turkey.

Born in Waukesha, Wis., June 11, 1931, Dr. Pranger attended San Diego State College until he transferred to the University of California, where he received BA, MA and PhD degrees in political science and philsophy.

Until he accepted the DOD assignment, he was assistant professor of political science at the University of Washington in Seattle. He served as assistant professor of political science at the University of Kentucky (1965-68) and as instructor and assistant professor at the University of Illinois (1960-65).

Pershing 1-A Missile System Deployed to NATO in Europe

Shipment of a battalion-size "package" of Pershing 1-A missile system hardware aboard the USNS Admiral William M. Callaghan, the world's first cargo ship powered by gas turbine propulsion units, from Port Canaveral, Fla., to Bremerhaven, Germany was announced in August.

Pershing 1-A systems, with support equipment mounted and ready to operate, were driven aboard the roll-on, roll-off vessel at Port Canaveral. From Bremerhaven they moved by convoy to Fishstein, for turnover to American artillerymen deployed in Europe as part of the NATO forces.

The earlier version of the Pershing system has been on station in Europe since 1964. During a year-long operation known as Project SWAP, all Pershing units in the continental United States have made the switch from the original equipment to the Pershing A-1 version.

DDRE Discusses University-Defense R&D Ties

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velopment program in the interests of our security?

After a period of debate, the answer emerged clearly. R&D would be no less important in the future than during World War II. The national research capability must not collapse. It must be sustained and strengthened. The Army, the Navy and then later the Air Force took up the challenge.

The Congress certified this answer in 1946 when it passed the genuinely landmark legislation creating the Office of Naval Research (ONR) with these words: "*To encourage scientific research because of its paramount importance to the preservation of national security.*" ONR then established the model for what became the federal pattern of support of academic science and engineering. The crucial characteristic of ONR's model was meeting *both* the needs of the Navy and those of the universities. Let's look at these needs.

Then, as now, the defense requirements fell into three categories. First, there was a need for first-class research to preserve our leadership. In some cases there were pressing needs for particular projects. More generally, there was a need to move ahead in fields urgently related to long-term national security problems. *In all cases, the country could not settle for work short of the highest technical standards.*

Second, there was clearly going to be a need for continuing consultation by specialists on critical defense problems. Then, as now, the capability for consultation often grew out of sponsored research activities. Many a faculty member has combined his independent capabilities, with work for defense, to provide crucial criticism and advice on national security issues to the Defense Department, the Executive Branch, and the Congress.

Third, the Defense Department recognized the continuing national needs for graduate education in research fields related to defense. Supporting first-class research inevitably has involved supporting part of the university's graduate educational function. DoD saw its part in the national responsibility for assuring a supply of trained manpower.

These three needs—for research, for consultation, and for trained manpower—were basic to our pioneering research philosophy in 1946. They form the framework for our outlook today.

From the university's point of view, there were also three central needs. First, the academic community's top priority was and is placed on education, on teaching and learning. And second, at the graduate level, research was and is an indispensable component of the student's educational experience and the faculty's competence.

To meet these goals, the university needed financial support and welcomed the opportunity to work on challenging defense problems.

The academic community welcomed Defense support partly because there was essentially no other source of funds immediately after the war. But just as important, I think, universites had then and have now a third goal: public service. National security work represents a satisfactory way for universities to combine research, education, and public service responsibilities, especially in the physical and engineering sciences.

Now it has been said that "all things excellent are as difficult as they are rare." I do not claim that in every respect the affiliation of universities with the Defense Department has been perfect. But I do believe our objectives and those of universities are essentially compatible and complementary.

A simple test of this is that we know just a few cases where academic research may have been hurt by Defense support, and in these cases it was not the Defense support *per se*, but the work itself which turned out to be infeasible or controversial or inappropriate. Yet we know scores of campuses on which research and educational excellence have flourished as a result of DoD's far-sighted financial support and sophisticated technical thinking.

All that I have said so far relates mainly to on-campus activities. But there is another type of DoD linkage to the academic community. This is the category of "special" off-campus laboratories, most of which were created during the decade after World War II—for example, the Lincoln Laboratory at Massachusetts Institute of Technology, and the Applied Physics Laboratory at Johns Hopkins University.

What is the nature of these laboratories? Why were they formed? Why are they needed?

They are off-campus because both DoD and the universities have recognized the burdens of scale—of a large laboratory heavily oriented toward engineering applications of advanced technology, and constrained by the inconvenience of large physically secure areas for classified work.

They are under university management because they were started by university faculty interested in national security work. They are almost entirely government-funded because the costs are much larger than the university could bear, no matter how interesting the project.

Yet there has been more to it. The academic environment has been desirable as a professional setting, as an assurance of independent technical competence, as a way to achieve a management flexibility not easily obtained within the government's laboratories, and, perhaps most significant, as a source of over-all technical and management judgment on what is

10 Years of 'Learning While Earning' Nets PhD Degree

Earning bachelor's, master's and PhD degrees in 10 years while employed as a U.S. Civil Service employe is the proud achievement of Dr. Daniel E. Frank, a research electrical engineer in the Army's Frankford Arsenal.

Frank's doctoral dissertation was "Bounded-Input, Bounded-Output Stability of Some Nonlinear Time-Varying Feedback Systems" and the degree was awarded by the University of Pennsylvania, where he received a master's degree 1966 in electrical engineering.



Dr. Daniel E. Frank

The laborious climb up the education ladder began for Frank following his appointment in June 1959 as a civil service employe with the Naval Ship Research and Development Center in Washington, D.C. He enrolled in the NSRDC Cooperative Education Agreement for study at Drexel Institute of Technology and was graduated with a BS degeee in June 1963.

Employed in the Fire Control Development and Engineering Laboratories at Frankford Arsenal, Frank conducts research on transient voltage suppression for combat vehicles and acts as consultant to fire control commodity engineers in feedback control problems.

and is not a worthwhile concept or program.

To the universities, these laboratories have brought opportunities for faculty and graduate students to participate in challenging advanced projects, in excellently equipped and staffed facilities; and an opportunity to affect our national security.

The major links in the association between DoD and universities, on campus research projects and large off-campus laboratories, have been solidly based on fundamental national needs—a continuing need for the best and most advanced defense research and development; a continuing need for participation in this R&D by specialized researchers and consultants from our universities.

Few would question the historically demonstrated success and mutual benefit of this association. Our country's technical and defense strengths have no peer. For more than two decades, our universities have benefited from DoD support. For almost three decades, the government has sought, and depended upon, the skills of university specialists trained and experienced in defense research whenever major strategic decisions are made.

Yet questions have been raised recently in many quarters about defense research on campus. The basis of the questioning is sensible. For we are being asked: What about the future? What about the current points of friction which threaten to break historic bonds? If changes should be made, how can proposals be debated and solutions implemented?

Let me first quickly state five current issues that influence the relationship between universities and the Defense Department. I will summarize my position on each and then discuss a few in more detail.

First, *Classified Research.* Many say that any form of secrecy is inconsistent with academic research. But of the total Defense-sponsored R&D on campuses, only about 4 percent is classified. Thus, I believe this issue is overrated. Many of the people at universities who have investigated the facts agree.

On the other hand, the Defense Department intends to do better at applying security regulations in acceptable, careful ways that minimize even further the administrative burdens and interruptions caused by classified activities at those campuses where faculty members choose to do classified work.

Second, *The Mix of Research and Development.* Some observers argue that the DoD tends to force universities into excessive developmental work. *Each university must decide whether its work should go beyond basic and applied research into development projects.*

In general, an institution's guidelines for sponsored R&D should be based upon what is "natural" to each field, upon what is desired by faculty and students, and upon the relationships between each possible project and the university's long-range goals.

Third, *DoD "Domination."* Some have charged that DoD "dominates" academic science and engineering because of its large funding and its unnecessarily comprehensive program caused by the absence of other strong federal programs acceptable to Congress. This is simply not true.

During the period after World War II, DoD contributed 80 percent of the total federal support of academic work. Today our contribution is about 17 percent, down by more than fourfold. The reason for this healthy trend is the growth in the R&D programs of the Atomic Energy Commission; Department of Health, Education and Welfare; National Science Foundation; National Aeronautics and Space Administration, and others.

Fourth, *Academic "Diversification."* Recently, critics have said that DoD makes it too difficult for universities to move away from defense work into nondefense work. We recognize the potential of some of our long-term academic R&D contractors to contribute solutions to pressing civilian problems. While we must pursue our congressionally approved programs vigorously, we have officially encouraged measured "diversification" by the large university-affiliated laboratories supported mainly by defense funding.

Fifth, *Independent Criticism.* I am frankly amazed when I hear the Department of Defense accused of suppressing independent criticism or of ignoring independent consultation by academic scientists. Surely the recent debates on the war in Vietnam and the ABM reveal the independence of the research community. Faculty and university administrators obviously speak out, whether or not they were or are on DoD's payroll.

Turning next to a detailed discussion of classified work on campus, let me try to provide some perspective. Over-all, of the approximately 5,000 DoD contracts and grants, representing total funding of more than $250 million at about 250 academic institutions, 96 percent are unclassified. Only 4 percent of the work in our contracts and grants, numbering about 250 at 60 universities and representing about $25 million, is classified.

There is another way of looking at this matter of classified work. Consider this way in which a typical university investigator in history, or medicine, or philosophy carries out research sponsored privately. Often the scholar obtains "privileged" memoirs, "sensitive" data or "personal, unpublished" manuscripts, and focuses his research on this material.

No one, except the scholar involved, normally has access to the material until results of the research are pub-

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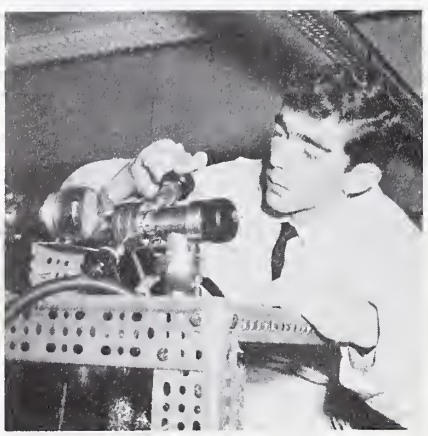
TCP Sponsors Foreign Exchange Study at Picatinny

Australia's training program for talented young scientists is enabling Frank May, a 26-year-old chemist, to study and do research at the U.S. Army's Feltman Research Laboratories, Picatinny Arsenal, Dover, N.J.

Under sponsorship of the Technical Cooperation Program (TCP) involving the United Kingdom, Canada, Australia and the United States, the employe of the Defense Standards Laboratory, Australian Department of Supply, will remain at Picatinny Arsenal from 12 to 15 months.

Australia learned of advanced work being conducted at Picatinny Arsenal in the field of scientific investigation (individual organic high explosives) on which May has been working in Australia since he graduated from Melbourne University. The TCP provides for exchange of selected scientists to pursue investigations of mutual interest.

Arrangements for May's visit had to be coordinated with the Australian Embassy in Washington, D.C., then with the U.S. Department of State, the U.S. Army Materiel Command and its Munitions Command.



Frank May

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lished. Medical data and legal records are private. Household survey data are private. Privacy is, of course, basic to many investigations largely to protect individual rights.

Thus, on a regular and continuing basis, specialized procedures are widely adopted within the academic community to limit access, for awhile, to some "sensitive" material acquired to use in research. Procedures do not usually prohibit access to all specialists in a field, nor to all students, but they do limit the number. They usually do not mean that the research is closed entirely or permanently, but they do limit the rate of release of research results.

These practices are sensible and appropriate. I fail to see why similar practices are objectionable when used to protect information related to our security. We have consistently taken actions to alleviate the burdens associated with classified projects on campus. In 1967, I formally reaffirmed a long-time informal policy that all *basic research* supported by DoD at universities will be unclassified.

However, some universities possess strong interests and special skills for *applied research* unique for necessary defense activities. Therefore, some applied research and development contracts funded by DoD at universities, normally at separate off-campus labs, are and must remain classified.

We annually review each classified contract with universities to ensure that the level of classification is no higher than the work actually requires under existing security regulations.

We intend to minimize further the amount of classified work by a more discriminating application of security regulations. In any event, practically all of the basic science underlying our classified advanced technology can be published about as quickly as any other scientific work, and it is published regularly.

It is worth noting, finally, that many investigators carrying out unclassified studies wish to have access to classified data, both to broaden their understanding and to facilitate their consultation; and they should have it.

Let me turn now to three of the other issues raised in campus discussions about the DoD-university relationship. One issue concerns the composition of work among the categories of basic research, applied research and development. Here are the questions:

Shouldn't universities limit their activities to basic research? Isn't development effort incompatible with the scholarly search for new knowledge? How should the integration of sponsored R&D with educational functions be managed?

My answer to this line of questions is simply that each university must decide and that, within each university, there should be room for diverse arrangements. In general, I believe it is wise to strike a balance among the more basic and the more applied projects.

Some of the finest work in our country has been accomplished in an environment enriched by training, research and application brought together under a university leader. It is hard to conceive of good medical training without "real-world" clinical experience.

Who would want to be operated on by a surgeon who was a theorist, who had not practiced in an operating room? By analogy, I suggest that good training in most sciences should include "real-world" experience, and this means some contact with what is called "development."

Another issue: How does DoD react in the proposals for "diversification" by some of its long-term academic contractors?

The short answer to this is that we recognize we will lose some talented and experienced resources, yet we may well gain ultimately. We recognize that the country has other important goals in addition to national security, and that there are potentialy revolutionary technical opportunities in fields not directly relevant to defense requirements.

A more subtle and powerful point in this issue, I believe, is that the character of a great research laboratory is determined by its sense of positive purpose. If a laboratory becomes entangled in a negative purpose—for example, to move away from work on national defense—it may be lame and weak. The challenge to those who wish to move into new areas is to create a new purpose, to chart a new and broad and positive course. When this is done, all else is likely to fall into place.

As far as resources are concerned, the share devoted to defense is decided by the President and the Congress. I hope you appreciate that DoD actually does not entice academic research groups into work on national security problems simply because we have substantial resources.

Our situation in the past has been and is today precisely the opposite. We receive far more proposals than we can fund. In fact, every year—including this year—we receive requests for funds six to eight times greater than our budget for the R&D considered appropriate for academic effort. And, as I mentioned earlier, today DoD has less than a fifth of the total federal resources allocated to acamic R&D.

A final issue: Can "independent consultation" occur in a meaningful way when DoD is the principal employer of so many leading scientists?

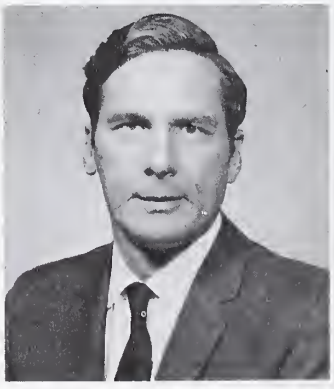
Putting this more crudely, hasn't

DASA Appoints Dr. Northrop Deputy Director for S&T

Deputy Director for Science and Technology, U.S. Defense Atomic Support Agency (DASA), recently became the title of Dr. John Northrop, who had filled the position in an acting capacity for about six months.

Notice of confirmation of his appointment was received from the Office, Secretary of Defense and United States Civil Service Commission.

Dr. Northrop was promoted to the position in an acting capacity following the departure of Dr. Nils F. Wikner in January to serve as scientific adviser to the Military Assistance Command in Vietnam (MACV). Since August 1967, Dr. Northrop had served as assistant to the DASA Deputy Director for Testing.



Dr. John Northrop

Immediately prior to joining the DASA professional staff, he was employed by the University of California at the Los Alamos Scientific Laboratory for eight years. When he left he was technical manager of experimental participation by the laboratory in weapons effects testing.

Dr. Northrop graduated from Phillips Exeter Academy in New Hampshire, received a BS degree in physics and mathematics from Yale University in 1948, and continued graduate studies there for a PhD in 1951.

DoD bribed the academic research community? No matter what side of an issue they are on, and no matter whose payroll they are on, most American scientists concerned with defense are not shy! The nation, the research community, and the academic community, thrive on debate. I support it. I get in and enjoy it.

I must emphasize this point seriously. If university scientists and engineers were entirely out of Defense work, they simply could not participate as technically informed individuals in debates on critical defense issues. They could not contribute as effectively to the public understanding essential for our system of government.

I trust that those who now examine the issues of DoD-university relationships, will consider seriously this aspect of the opportunity and responsibility inherent in defense efforts.

There are, of course, as I have said, many other issues being debated on campuses across the country—the war in Vietnam, the draft, ROTC, modern transportation, pollution control, and most broadly, the use and abuse of science and technology in relation to national goals.

Thus an enormously important subject is the mechanism of change: how to debate issues effectively and how to make wise changes in our past patterns. In closing, I want to give you my views on how changes can be made, and how they should not be made.

Let me begin by emphasizing that the Defense Department is prepared to make changes in the pattern of its interaction with the university community. As President Nixon observed, many students today are pointing out "wrongs which must be made right" in the educational community.

Where such wrongs arise from or are reinforced by DoD's actions, we are prepared to work hard at correcting them. Where there are points of friction, we must assess them, and make careful judgments on how to resolve them.

Too often in recent debates on campus, the full cast of participants in this process is not recognized. Let me explain. Certainly, university goals must be debated and agreed within the university itself—by students, faculty, administrators, alumni, trustees, donors. But as these goals are set, and after they are set, many other participants influence the activities of a university.

To begin with, the faculty will exercise its traditional privilege to seek sponsors for their research. The potential sponsoring agencies in the federal government must submit their programs and requested budgets to the President and then to the Congress for review.

The DoD and the President may make a firm proposal on priorities and plans. But the Congress establishes national priorities, reflecting all of the formes of U.S. public preferences and the international situation.

Thus, a simple choice or proposal at a university will be balanced against the views, responsibilities, objectives, and needs of many groups. Unless we recognize this complex, interlocking set of participants, we have not considered the mechanism of change—or, at least, we have not considered a proposed change realistically.

No single individual, no single group, can commandeer the system for long. Of course, intense difficulties, more or less similar to a veto power, can be created temporarily by any participant. This is simply the nature of the system.

All of this should not *be disheartening to those who argue for change. Our situation is changing constantly. Major innovations in the pattern of university research were introduced 25 years ago, have been recently, and can be again. So-called "non-negotiable demands" are inconsistent with a process of change characterized by legitimate but competing interests.*

There are many successful architects of change and most of them work in the same way. They improve one thing at a time, case by case,

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Aberdeen Proving Ground Command Civilian Goes to ICAF

Selection of Robert L. Johnson as the first civilian employe of the Aberdeen (Md.) Proving Ground Command to attend the Industrial College of the Armed Forces, Fort Leslie J. McNair, Washington, D.C., recently recognized his future career potential.

Only four civilian employes of the Department of the Army are selected each year to attend the ICAF. Candidates must have exceptional qualifications and performance records and the potential to achieve high position in the Department of Defense.

Col George C. Clowes, APG commanding officer, who nominated him, said: "Mr. Johnson is one of approximately 100 employes at the GS-13 and higher levels under my management supervision. Among these, he is without parallel. I place him within the upper three of such individuals with whom I have been associated throughout my military career."

Operated as a joint educational institution under direction of the Joint Chiefs of Staff, the ICAF is considered the capstone of the military educational system in the management of logistic resources for national security.

ICAF's mission is to conduct courses of study related to economic and industrial aspects of national security and in the management of resources under all conditions. Due consideration is given to the interrelated military, political and social factors affecting national security, within the context of national and world affairs.

The ICAF annually accepts 49 senior officers and four civilians from each of the three Military Departments, plus representatives of nondefense U.S. Government agencies (total of 180 this year).

Upon completion of his training, Johnson will occupy a top civilian executive position at Aberdeen Proving Ground, involving administration of complex management programs and command level problems.

During 22 years in U.S. Government service, he has held progressively important positions, predominantly in the field of financial management, including four years as deputy comptroller at Aberdeen. He also has lectured in accounting in the Department of Economics and Business Administration at the University of Delaware, where he earned bachelor and master degrees in accounting.

Until 1951, his father was senior superintendent of Aberdeen Proving Ground storage areas. His mother was one of the first six women to be transferred to this installation from Sandy Hook (N.J.) Proving Ground when it was deactivated in 1917.



ICAF selectee Robert L. Johnson and Col George C. Clowes APG CO.

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looking at the merits of each case with respect to over-all goals. They change by introducing something of greater value to replace or supplement what is already present. This is precisely the pattern which universities can follow in terms of their relationships with DoD.

Each of hundreds of contracts is negotiated individually each year. Each negotiation provides an opportunity for choice. A project should not be considered important by the university simply because DoD says so—the university must make its own judgment.

R&D is appropriate for a university only when the academic investigators and administrators have discussed the R&D with the sponsor and agree to the match. Changes can be made in the course of this process.

I believe we have seen recently an attempted tyranny by minority. Violent means have been used in attempts to impose the untested ideas of a small minority on the rest of the students and faculty whose rational choices are central to research and education.

If small bands of demonstrators continue to disrupt campuses, they jeopardize the vital traditions of free and orderly debate and of individual freedom of choice which are at the foundation not only of our great universities but of our country. The worst outcome would be a fundamental change in the environment at our finest institutions.

The *New York Times*, in summarizing the significance of the turmoil at Harvard, put this matter squarely:

"What is at stake now is nothing less than the perpetuation of universities as centers of reason in a free society. To permit them to be paralyzed or subverted by any lawless, coercive force of whatever political ideology or objective is to give up on the survival of free society itself."

I urge all those who care about the individual's right to pursue education and research in his own way, to assert themselves now. We must assert four crucial, simple propositions:

- Adademic freedom must mean freedom for each scholar or it may be lost to all scholars.
- All R&D projects must continue to pass the test of genuine mutual interest—to the investigator, to the university, to the sponsor.
- Universities have a critical public service responsibility.
- National security R&D is a relevant, significant public service function for universities.

The continuation of the university life we cherish requires freedom and thrives on peace. Hence, universities serve their own best interests when they contribute to the common defense. I believe that as this issue is fully debated on our campuses and throughout the country, these four propositions will emerge as a guiding consensus and a national conviction.

AMC Employes Draw Anniversary Acclaim, Challenge

(Continued from page 10)

put of more than 600 engines per month from a beginning figure of 19 in 1962.

- *Currently under development is a 50,000-pound capacity airdrop system for the C-5 aircraft, which will be able to airdrop four such loads. A new 135-foot parachute for use in the system has passed design tests.*
- Engineering development was completed in what AMC believes may be the most important breakthrough in mechanical time fuzes for artillery since World War II. The fuze, which will undergo extensive field tests soon, features greater accuracy, greater coverage of optional time settings, universal application to all artillery calibers, improved decisive setting action, and improved sealing against moisture and temperature effects.
- *Lance, the Army's newest battlefield artillery missile, now in engineering development, successfully completed a series of critical environmental flight tests. Lance is capable of carrying either a nuclear or conventional warhead, and is the first Army missile to use prepackaged, storable liquid propellants.*
- A confirmatory test of the 20mm Vehicle Rapid Fire Weapon System for the M114-A1E1 Command and Reconnaissance Vehicle was completed in Europe. It provides scout and reconnaissance personnel added firepower.
- *Rigorous flight tests against both moving and stationary targets were conducted with shoulder-fired Dragon antitank missile system.*
- Units of the new Self-Propelled Hawk Missile were shipped to Europe in preparation for issue to troops. The low-altitude, all-weather Hawk system was developed to provide a highly mobile air defense capability in forward areas. The launcher tows necessary radar and equipment.
- *Continuing progress was made toward meeting the Army's immediate and long-range requirements for new and improved vehicles. Included in this category are the U.S./Federal Republic of Germany Main Battle Tank program, award of a contract for development and production of 18,000 new cargo vehicles (XM705 1¼-ton truck) over a 3-year period, and a new model ¼-ton truck incorporating new design features to increase safety, reliability and durability approved for production.*
- A program of rebuild and retrofit of M48A1 tanks to the M48A3 improved configuration for use in Vietnam was completed in FY 1969. Assembly line output of the new M656, 8x8, 5-ton truck started during FY 1969. Approval is expected soon of the contract definition phase of the Armored Reconnaissance Scout Vehicle (XM800), which will replace the M114A1 in the Army inventory. The Mechanized Infantry Combat Vehicle (MICV) is expected to enter the contract definition phase later this year.

MRC Schedules Graph Theory Seminar, Oct. 13-15

An Advanced Seminar on Graph Theory and Applications is scheduled Oct. 13-15 at the Mathematics Research Center, U.S. Army, Madison, Wis., with participants expected from Canada, France, Jamaica and the U.S.

Speakers representatives of leading U.S. universities, IBM Corp. and the Rand Corp. will discuss applications of graph theory to the social sciences, electrical networks, experimental design, and other areas.

The seminar, it is stressed, is not in any sense a conference and will not be programed for presentation of research papers. Questions from the floor will be encouraged to stimulate the communication of ideas.

Preference will be given to Army personnel but, as space permits, a limited number of invitations will be sent to representatives of other government agencies, contractors, academic personnel, or others whose presence will contribute to objectives of the seminar.

Any Army personnel interested in attending should write to: Secretary, Advanced Seminar, Mathematics Research Center, U.S. Army, University of Wisconsin, Madison, Wis. 53706. A statement of his position or scientific or engineering qualifications should be included.

SCIENTIFIC CALENDAR

International Orbiting Laboratory and Space Sciences Conference, sponsored by the International Academy of Astronautics and AFOSR, Cloudcroft, N. Mex., Sept. 29–Oct. 2.

International Electronics Conference, Toronto, Canada, Oct. 6–8.

International Symposium on Blood Oxygenation, sponsored by TSG and U. of Cincinnati, U. of C., Ohio, Oct. 6–8.

National Aeronautic and Space Engineering and Manufacturing Meeting, sponsored by SAE, Los Angeles, Calif., Oct. 6–10.

13th Annual Organic Chemistry Conference, sponsored by AMC and NAS-NRC, Natick, Mass., Oct. 7–8.

9th Annual National Conference on Environmental Effects on Aircraft and Propulsion Systems, sponsored by the Naval Air Propulsion Test Center, Bordentown, N.J., Oct. 7–8.

Materials Engineering Congress and Exposition, Philadelphia, Pa., Oct. 13–16.

19th Canadian Chemical Engineering Conference and the 3d Symposium on Catalysis, sponsored by the Chemical Institute of Canada, Edmonton, Alberta, Canada, Oct. 19–22.

6th Annual Meeting and Technical Display, sponsored by AIAA, Anaheim, Calif., Oct. 20–24.

40th Shock and Vibration Symposium, sponsored by NASA, Hampton, Va., Oct., 21–23.

15th Conference on the Design of Experiments in Army Research, Development and Testing, sponsored by ARO-D and AMSC, Redstone Arsenal, Ala., Oct. 22–24.

Electronics and Aerospace Systems Convention and Exposition (EASCON '69), sponsored by IEEE, Washington, D.C., Oct. 26–29.

9th Interscience Conference on Antimicrobial Agents and Chemotherapy, sponsored by American Society for Microbiology, Washington, D.C., Oct. 27–29.

CE Tests New Road Construction Materials

Grandma's gift for colorful terminology, such as "pigs in a blanket" for pork sausage baked in cabbage leaves, finally has been surpassed by the U.S. Army Corps of Engineers' "roads in a raincoat" concept, intended for combat areas.

Investigation of this concept to reduce time and costs of construction of roads under adverse soil conditions was announced in July by the Corps of Engineers. Use of the "raincoat," a plastic wrapper to encase the subgrade material of a road, provides protection as a waterproof seal aginst the migration of subsurface moisture into the material.

In this way the wrapper enables builders to substitute fine-grain subgrade materials, such as are common in Vietnam, for a granular base course in the area of the road site.

The technique is designed to eliminate the need of locating and quarrying rock, bringing in crushing equipment, and long hauls by truck to the road construction site.

The raincoat consists of polypropylene fibers inserted into a cotton scrim by a needle-point process that reinforces a distributor application of asphalt to form a membrane. Polypropylene being tested comes is sections 15 feet wide and up to 300 feet in length.

Asphalt is applied to the polypropylene strip after it has been laid over the selected road site. The subgrade material is filled in, compacted and covered by another strip of polypropylene. The two sheets of polypropylene then are sealed to encase the subgrade material.

Another application of asphalt is compacted on the subgrade to provide a road ready for traffic. Trafficability can be improved if sand is readily available to dust the surface. The engineer-project manager in the Military Engineering Directorate, Office of the Chief of Engineers, stated:

"In the lower layer, the membrane acts as a waterproof seal. . . . On the upper surface, the polypropylene fibers reinforce the asphalt, permitting much greater deflection under traffic than asphalt alone while remaining completely waterproof."

Although U.S. Army Corps of Engineers spokesmen say the concept has demonstrated its soundness in tests to date, research is continuing to improve the membrane. Other materials will be tested in an attempt to obtain a cheaper and perhaps better membrane.

The U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Miss., reports that tests have shown that the membrane encasement with the asphalt treatment provided an adequate wearing surface for military convoy traffic of 2- and 5-ton 6 by 6 cargo trucks.

In one series of tests, an 18-inch depth of clay inside a membrane envelope successfully supported 2,000 passes of a 25,000-pound single-wheel load with 250 pounds per square inch tire-inflation pressure. The results were obtained on two different test sections during various temperate zone climatic conditions prevalent at Vicksburg.

Other tests at Dyess Air Force Base, Tex., indicated that the membrane, used in conjunction with a heavy-duty landing mat, functioned satisfactorily as a waterproofer for at least six months while sustaining 250 coverages by heavy transport aircraft traffic.

WES laboratory researchers reported to the Chief of Engineers that the tests indicated the combination of polypropylene and asphalt also can be used for other surfacing, as waterproofing, as dustproofing on roads, streets, hardstands and air terminals.



POLYPROPYLENE-ASPHALT road surfacing at WES, Vicksburg, Miss. After subjection to more than 2,000 coverages of military vehicles up to 5-ton trucks, over a period of two years, the road remains in good shape.



CE construction engineers lay polyprophylene cover over prepared subgrade.

Committee Appraises ROTC Program Administration

Interrelationships of the Armed Services Reserve Officer Training Corps programs, including relations with faculties, students and administrations, are being appraised by a special committee by request of Secretary of Defense Melvin R. Laird.

One purpose of the committee of academic and Armed Services representatives will be to determine the extent of uniformity desirable in the administration of ROTC programs. Findings and recommendations of the study group are expected to be made available about Sept. 1.

Dr. George S. Benson, president of Claremont Men's College, is chairman of the committee, which works with Assistant Secretary of Defense (Manpower and Reserve Affairs) Roger T. Kelley.

Other academic members are Dr. E. Howard Brooks, vice provost, Stanford University; Dr. Claude E. Haley, dean of John Jay College, City University of New York; Dr. Herbert E. Longenecker, president, Tulane University; Dr. Donald R. Mallet, vice president and executive dean, Purdue University; Dr. Dayton S. Pickett, assistant vice chancellor for academic affairs, University of Illinois.

Armed Forces members of the committee are Brig Gen Clifford P. Hannum, deputy director, Individual Training for ROTC Affairs, HQ DA; Maj Gen Lester Miller, director, Personnel Training and Education, Department of the Air Force; and Sheldon H. Kinney, assistant chief, Education and Training, Bureau of Naval Personnel.

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FAAS–85 GENERAL OFFICER REVIEW BOARD — Front row (l. to r.): Maj Gens George P. Seneff, James W. Sutherland, Robert R. Williams and George S. Eckhardt; Lt Gens Austin W. Betts, Harry W. O. Kinnard and John J. Tolson; Maj Gens George I. Forsythe and John L. Klingenhagen. Back row: Brig Gens Hal B. Jennings Jr. and George W. Casey, CDC Scientific Advisor David C. Hardison, Brig Gen Raymond P. Murphy, Maj Gens Charles P. Brown and Charles J. Denholm, Brig Gens George S. Blanchard and George S. Beatty Jr., Maj Gens John Norton, Delk M. Oden and John H. Hay. Conclusions of the board will impact on future development of Army aircraft.

19 General Offices Review Army Aircraft Systems

Review of a recently completed Family of Army Aircraft Systems Study 1970-85 (FAAS-85) was accomplished by 19 general officers with extensive interest and background in Army airmobility activities.

Lt Gen Harry W. O. Kinnard, CG of the U.S. Army Combat Developments Command, Fort Belvior, Va., chaired the general review board sessions at Carlisle Barracks, Pa., shortly before his retirement from the Army in August.

Conclusions and recommendations of the board are being applied to the study prior to Combat Developments Command submission of the final report to the Army Chief of Staff.

FAAS-85 was initiated by direction of General Kinnard to determine Army aviation requirements to support, in the 1970-85 time frame, the five basic functions of combat-mobility, firepower, service support, intelligence, and command and control.

Brig Gen George W. Casey, FAAS-85 study director and commander of CDC Combat Arms Group, Fort Leavenworth, Kans., gave a briefing on the study to the review board. Discussions followed on R&D priorities and aircraft phase-in schedules, as well as detailed analysis of proposed aircraft to serve each of the five combat functions.

Speakers included representatives from CDC's Armor Agency, Fort Knox, Ky.; Transportation Agency, Fort Eustis, Va.; Field Artillery Agency, Fort Sill, Okla.; Intelligence Agency, Fort Holabird, Md.; Medical Service Agency, Fort Sam Houston, Tex.; Aviation Agency, Fort Rucker, Ala.; Combat Service Support Group, Fort Lee, Va.; Combat Support Group, Fort Belvoir, Va.; Combat Arms Group and Institute of Combined Arms and Support, Fort Leavenworth, Kans.

Research Analysis Corp. representatives from McLean, Va., presented a briefing of follow-on cost effectiveness studies for FAAS-85.

Among attendees was Maj Gen George I. Forsythe, commander of the Army Infantry Center and School, Fort Benning, Ga., who succeeded General Kinnard as CDC commander. General Forsythe commanded the First Cavalry Division (Airmobile) prior to assignment to Fort Benning.

The completion of FAAS-85 and the general officer review board conclusions are considered significant milestones in airmobility's evolution, involving men whose careers have guided airmobile concepts and operations through the 1960s.

Services OK First Design of Mobile Power Sources

Interservice approval (Army, Air Force, Navy, Marine Corps) of the first design for a Department of Defense Family of Mobile Electric Power generator sets, announced recently, is based on joint effort since July 1967.

A project manager for Mobile Electric Power (CPM-MEP) was designated at that time with the objective of achieving "some semblance of order. . .in a chaotic situation resulting from continuous proliferation of makes and models of engine generator sets."

The action was based on recommendation of a Department of Defense Ad Hoc Study Group that a project manager's office be established with a primary mission of creating and maintaining a DoD family of generators.

Designated as DoD executive agent for the project, the Department of the Army assigned Col J. J. Rochefort Jr. as project manager. Since the activation of the effort, a 66-member generator family has been established and a firm standardization program adopted.

Joint operating procedures also have been prepared and ratified by Army, Air Force, Navy, Marine Corps and Defense Supply Agency representatives in areas of research and development, configuration management, procurement and production, and related activities.

The first drawings describing a portion of the DoD generators family were completed recently and approved by a technical group representing all the military services at a meeting in the project manager's office in July.

The action initiates full-scale configuration management of the generator family, believed the first on DoD-wide basis of an item less than a major weapons system. Future effort will be directed toward further reductions in the family of generator's and development of a second-generation family that will include turbo-alternators.

Federal Executives Elect Cerar As President of Maryland Unit

Col Paul R. Cerar, Edgewood Arsenal commander, has been elected president of the Maryland Federal Executive Association (FEA).

Established at the direction of the late President John F. Kennedy as a nation-wide organization, the FEA in Maryland is composed of the heads of all federal field offices and installations throughout the state.

Other newly elected officers include:

Paul Lawrence, regional commissionar, U.S. Customs Department, vice president; Maurice Kinslow, district director, Federal Food and Drug Administration, and Warren Bloomberg, U.S. Postmaster in Baltimore, who will serve on the policy committee for 3-year terms; and Harlan L. Woolwine, district director of the Immigration and Naturalization Service, 1-year term on policy committee.

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